THE
ELECTRICAL REVIEW

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Hire and Hire Purchase

Schemes Must be Continued

A VERY large proportion of the domestic electrical load has been built up by providing consumers with installations and apparatus on "easy terms," i.e., by means of hire, hire-purchase or deferred-payment schemes. To find the cost of, say, an electric cooker in one lump would have been too much for a great number of domestic consumers.

Long before domestic electrification was properly tackled the gas industry had found that the provision of apparatus on terms which the poorest people could afford was remunerative. In spite of this, electricity supply authorities were in no hurry to follow suit. About ten years ago the committee appointed by the Electricity Commissioners to consider and report on assisted wiring and the hiring and hire purchase of electrical apparatus found that only 213 undertakings out of 650 (163 local authorities and 50 companies) had adopted assisted-wiring schemes by the end of 1928-29. In the matter of the provision of apparatus the record was a little better; 304 undertakings had facilities in operation, but this was still less than 50 per cent. of the total. The Committee recommended strongly that undertakers who had not done so should institute schemes, while those who had should amplify them "in an endeavour to obtain uniformity of practice in this matter throughout the country."

McGowan Committee's View

The case for hire and hire purchase was further strengthened by the McGowan Committee on Electricity Distribution, which recommended that "the creation of a demand in small-class property should be encouraged by the offer of facilities for hire and hire purchase of apparatus and assisted wiring."

In the period which has elapsed since the date quoted by the Commissioners' Committee matters have improved in a remarkable way and a great majority of members of E.D.A. have reported that they have hire or hire-purchase schemes in operation. Or, should we not say, *had* schemes in operation, for the outbreak of war brought them to an abrupt halt, due mainly to the restrictions placed on expenditure, but also, we fear, partly to the undertakings' own unwarranted nervousness. We do not believe that it was the Electricity Commissioners' intention that all development which was not primarily for war purposes should cease. There are still many good reasons why electricity should continue to expand.

The financial restrictions apply, of course, to public authority undertakings and not to companies, who can spend surplus revenue for capital purposes and are restricted only so far as materials may be difficult to obtain. This anomaly is the logical outcome of the too-prevalent policy of regarding municipal undertakings as mere local government departments instead of commercial enterprises. This led to a peculiar position at Bradford, where the company undertaking was able to announce the continuance of hire and hire purchase while the Corporation had suspended its schemes. The Corporation, very sensibly, decided to resume its activities.

Good Examples

It is greatly to the credit of Bradford and some other undertakings (Hull, Tynemouth and Colne, for example) that they are continuing or have restored their schemes. Local conditions may have had an influence in the matter (*e.g.*, the undertakings may possess large stocks of appliances), but, at all events, the way is shown to other undertakings.

The same position appears to exist in the gas industry, although we believe that the stoppage was not so widespread and that there is a strong movement among gas undertakings to restore schemes which had been dropped.

Some light is thrown on the subject of hire and hire-purchase—so far as electric cookers are concerned, at least—by the E.D.A. Electric Cooking Committee. It was shown at a recent meeting that, apart from a certain falling-off in evacuated areas, which was to be expected, the public demand for electric cookers is being well maintained. The Committee expresses the view that any unnecessary restriction of means by which consumers can obtain cookers would be against the public interest and would result in more business going to gas suppliers who offer suitable facilities for the hire or hire-purchase of cookers. A resolution was passed, and subsequently approved by the E.D.A. Executive Committee, that :—

> The E.D.A. Electric Cooking Committee considers that the provision of cooking facilities is a public need and recommends that hire and/or hire-purchase schemes for electric cookers should be continued on terms and conditions

which are not less favourable than those offered by gas undertakings for gas cookers in the same area.

This resolution has our hearty support. So far as is possible in the existing circumstances, the normal life of the people must go on. If hire and hire-purchase schemes were essential before the war they are no less important now. Cooking and heating by electricity is more economical than the burning of raw coal, apart from the saving in distribution work and costs which electricity effects. No doubt schemes will have to be modified in some cases, but we insist that their abandonment is not in the public interest and will do nothing to win the war.

No Services

ANOTHER aspect of the restrictions placed upon the activities of municipal supply authorities is seen at Southport. The local contractors are complaining that houses which they have wired all ready for connecting up are still without a supply, although service cables and men are available. The Corporation Electricity Department attributes the standstill to the instructions received from the Electricity Commissioners. It says that while applications have been made for permission to carry on with these services no sanction has been received. Until the contractors' customers receive their supplies they naturally cannot be expected to pay for the installations and so the contractors are suffering from delays which make it difficult for them to carry on. The position is most unsatisfactory and appears to result from the rigidity inseparable from official control which makes rules and permits no departure from them, however small.

Nobody's Babies

BETWEEN the Joint Boards (staff) and Joint Councils (workers) in the electricity supply industry there seems to be a no-man's land. In this deserted waste dwell (among others) the installation foreman and the installation inspector (charge hand). The agenda for the last meeting of the Hammersmith Borough Council discloses that neither the Boards nor the Councils consider that these men come within their scope, and consultations between the two have not ended the deadlock. The neglected ones might possibly find refuge within the A.S.E.E., but then that Association does not yet form part of the industry's Whitley system. The Hammersmith Council intends to get over the difficulty by stating, when it advertises these posts, that applicants' qualifications must be such as to "bring them within the ambit of the No. 10 District Council schedule."

The Institution's History

INCLUDED in this issue is a review of the new History of the Institution of Electrical Engineers which has been prepared by Commander Rollo Appleyard at the instance of the Council. Much of what is recorded has happened within the life of senior members of the electrical profession, and Dr. Alexander Russell, who reviews the book for us, is for many reasons in an exceptional position to assess the value of the past in relation to the present and the future. Not the least of these reasons is that he has been responsible at Faraday House for the training of many electrical engineers who have since done yeoman service in the world—some of them being among the most eminent representatives of their profession to-day.

I.E.E. Sections

MANY branches of electrical technology possess characteristics that are sharply enough defined to entitle them to be regarded as definite units. Practitioners in these fields may regret the small amount of time that can be allocated to their subjects at ordinary meetings of the Institution of Electrical Engineers. To meet such cases the I.E.E. has set up semi-autonomous Sections which can draw up their own programmes, but this procedure is warranted only when such Sections are shown to meet a real need by the interest taken in them by those most closely concerned. Mr. F. W. Purse, this year's chairman of the Transmission Section, is, no doubt, right in attributing to misapprehension rather than to indifference the relatively small proportion that the membership of his Section bears to the total membership of the Institution. There are certainly far more than 1,700 men out of the total I.E.E. membership of nearly 20,000 who are engaged on transmission and distribution, and a good many more would be expected to enrol in an Installation and Utilisation Section, if formed. The misapprehension, which we believe to be widespread, is that possession of the requisite qualifications of itself makes one a member of an appropriate Section. That is incorrect; interest in the work of the Section has to be proved by a definite application for membership of it on a prescribed form. There is, of course, no addition to the annual subscription.

London J.E.A. Finances

THE delicately poised finances of the London and Home Counties J.E.A. have been upset by the war. It was stated this week that an adverse balance of £84,850 was anticipated for 1940, raising the accumulated deficit to £213,240. It was only a year ago that the Authority raised its charges by 10 per cent. and revised its hire rentals in order to restore equilibrium and produce a gradually rising surplus to set against past losses. The latter were to be wiped off by 1943, but now conditions have caused a serious setback. Most of the Authority's area of supply is outside the "danger zone," but it includes "dormitory" districts, from which, no doubt, many London workers have departed. We notice that the Finance Officer's report was dated Oct. 30th, which may possibly mean that it was based on the 75 per cent. ration. Possibly, too, the raising of the prices last year has had an adverse influence. We know of several instances of consumers reverting to gas, and although we do not wish to reason from the particular to the general, we think that further serious price increases may not remedy matters.

Vehicle Lighting

ALTHOUGH the attraction that good lighting of road vehicles has for passengers is denied them under present conditions, this consideration should not be allowed to detract from the interest taken in the recently issued Interim Report on the Illumination of Public Service Vehicles (obtainable from the Public Service Transport Association, 5s. 6d., post free), since its recommendations apply to all new orders placed. The average illumination level proposed of 3.5 ft.-candles, which, although not remarkably good, should be adequate for reading on short journeys, would appear to be as high as statutory constructional requirements make practicable. This standard would entail the use of a 12-W lamp for each transverse seat or for every two or three passengers on a longitudinal seat. The fitting should be designed to direct the greater part of the light downward. While a higher efficiency can be realised with a 12-V than with a 24-V system, the latter possesses many advantages for transport work. A point which is not referred to in the report is that the case for the higher voltage is reinforced when trolley-buses are used in view of the facility it provides for battery manœuvring.

Science Fails

AN ex-science teacher was summoned at a Scottish court recently for an offence under the Lighting (Restrictions) Order. A light in his house was said to be shining through a glass door and was visible a hundred yards away. The defendant, in an able lecture on the nature of light transmitted through various media, sought to show that it was so dissipated as to be incapable of illuminating by the time it had struggled through the glass door. The Sheriff was evidently impressed but imposed a fine of 10s. all the same.

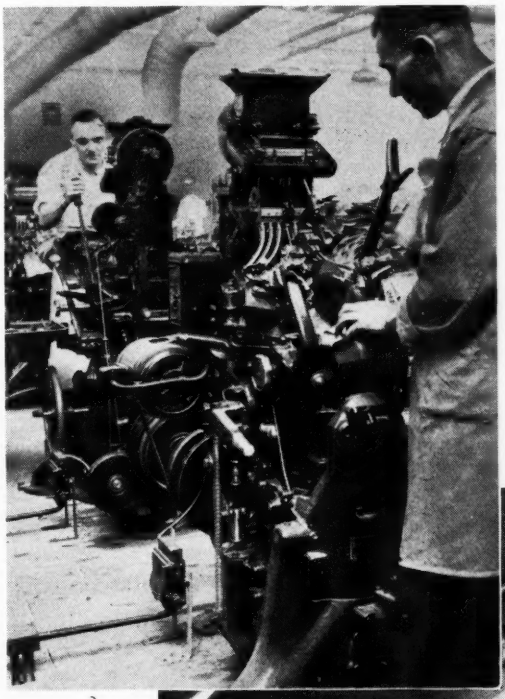
MODERN SHOEMAKING

Neat Electrical Installation

A FACTORY which in lay-out, production methods and efficiency is one of the most advanced of its kind in this country is that of John White (Impregnable Boots), Ltd., at Rushden, which we recently visited.

The two-storey structure with exceptionally ample window space is designed for a maximum output of about 15,000 pairs of boots and shoes per week. A total HP of 367 is represented by 245 motors, varying in size from ¼ to 25 HP each. In addition, the factory electrical load includes 44 kW of process and space heating and 63 kW of lighting. The ground floor is devoted to the production and preparation of the bottom leather, *i.e.*, outer and inner soles, to meet the requirements of all six factories of the company, while the top floor is devoted to the production of tops (uppers) and the assembly and finishing of boots and shoes.

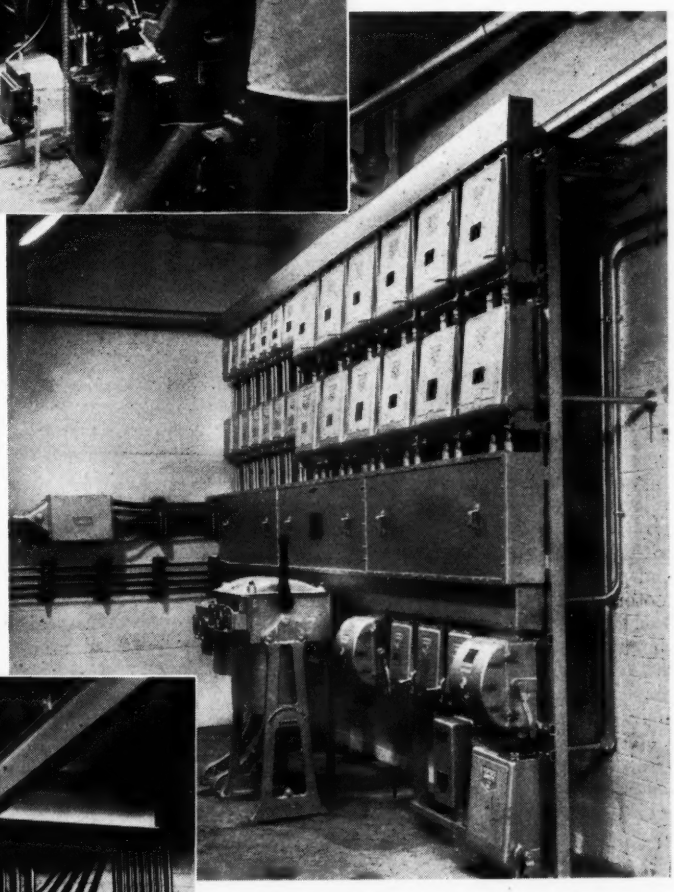
Briefly, the processes are as follows. Rough bottom leather is received at one corner of the ground floor by a chute and, as required, it is taken to "Revolution" presses by an overhead run-way incorporating an Avery weighing machine. The presses are motor driven and the downward moving swinging beam is operated by a clutch. At each downward movement of this arm pressure is brought to bear on a specially shaped knife resting on a bend of leather which roughly cuts the sole to the required shape in one stamping operation. In all there are 30 of these seven-foot presses and most of them are group driven, a practice which is confined to this section for elsewhere not an overhead belt is to be seen. In the case of the sole presses, however, group driving can be shown to be an advantage. Six of them are driven by a 10-HP motor mounted in the roof structure with belt transmission, and such is the operation diversity that the three individually driven presses each require a 5-HP motor.



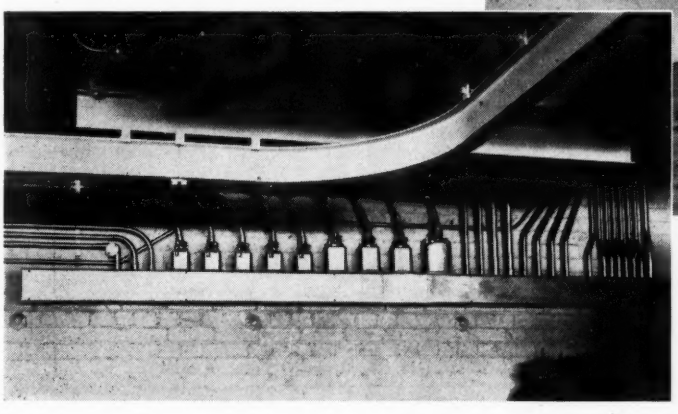
Pulling over the upper on to the last

The roughly cut soles are passed to grading machines which predetermine the smallest substance of a sole and reduce the whole to that thickness by means of rolls and knives. Each machine is driven by a 1-HP motor with belt transmission. After hand sorting for quality and substance under lighting by Benjamin "daylight" fittings soles not intended for dispatch to other factories are passed to the preparation room where they are subjected to a number of treatments in readiness to join in the process flow line with the prepared uppers on the first floor. Insoles are cut in a similar manner according to the lasts with which they will be used later on.

One machine rounds the insoles to pattern and another buffs the grain off. On an insole channelling machine slots at a slight angle to the horizontal are cut near the periphery of the sole, both inward and outward so that, after having an adhesive mixture applied, the fins produced by the slots can be turned up and stuck to provide a wall on which the welt is later secured. All this represents a number of operations and even the application of the



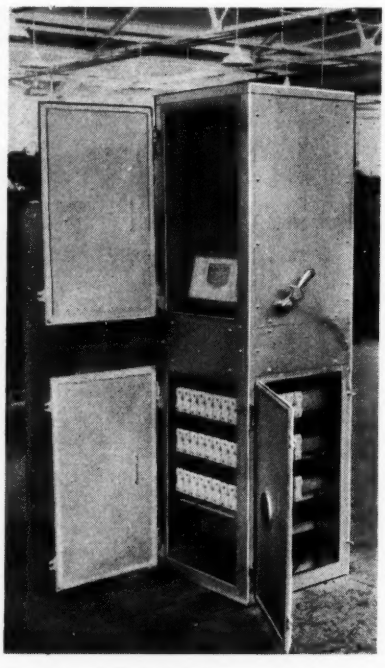
The main distribution board and (below) the trunking outside the distribution chamber which facilitates circuit arrangements



adhesive mixture is the work of one individually driven machine.

Raw material for the uppers is received as skin in bundles which are elevated from vehicles at road level by means of a small Morris self-contained motor-driven hoist. The first operations are carried out in the clicking room where the components of the upper are cut from the skin by specially shaped knives on presses similar in principle to those employed for cutting the outer soles. Each press is driven by a 1-HP B.T.H. incorporated motor which is controlled by an Igranic push-button starter. In some cases transmission is *via* a belt and jockey pulley, but the latest practice is short V-belt driving.

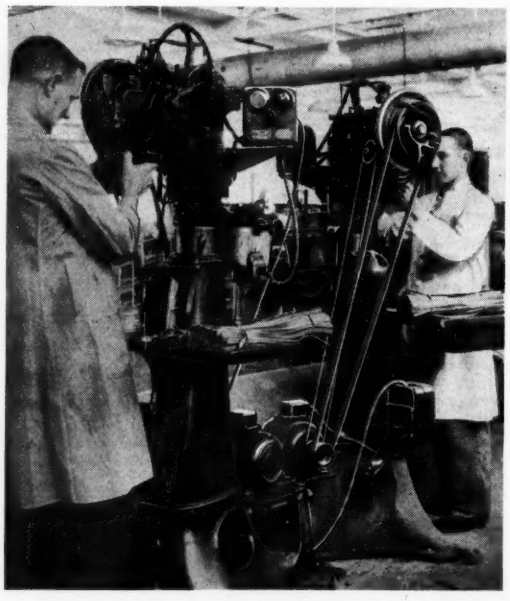
The components of the uppers are machined together in the closing room where also many other operations are effected, such as tapering off the edges to avoid bulky seams, burnishing edges to avoid turnovers, perforating and gimping for decorative work and eyeletting. Stitching is a major operation in this room, of course, and Singer sewing machines are employed throughout for this purpose. The machines are arranged in double lines per bench with about 10 units on a group drive. The motor is arranged under the bench and drives a line shafting from which each machine is belt driven. The motor varies in size from 1½ to 3 HP, according to the type of machine driven and the class of work on which it is engaged. On each machine there is a special 6-W, 12-V needle-point light arranged on a universally adjustable bracket to suit the personal needs of the operative. The needle-point lights for all the machines on each bench are served from a small wall transformer.



Floor mounted distribution cabinet in the lasting room

In the lasting room the prepared uppers and bottoms meet, and from the tacking of the insole on to the last the shoe is gradually built up in a series of quite separate operations until the product is finally removed from the last as a complete shoe and passed on for dressing and dispatch. At a guess we should say that there are something like 50 distinct operations carried out in these departments, each on an individually driven machine with an incorporated motor and push-button starter. The motors vary in size from ¼ to 3 HP, and the popularity of the short V-belt drive is much in evidence. Many of the machines include heating with element loadings varying from 100 W to 2 kW.

In the early part of the flow line and in one operation the upper is assembled and pulled over the last, tacks being driven home to secure the upper to the wall built up from the channelling of the insole in the preparation department. The machine is very ingenious, being a series of pincers attached to levers which, when operated, follow very closely the action of a hand-laster at work. Later the surplus material is trimmed off and the welt is sewn to the channel. In-seam trimming is a further operation and so is welt beating whereby, under the influence of a rapidly moving hammer, the projecting welt is levelled out during its passage through the hammering position by movement of the shoe in relation to the machine.



Sewing the welt to the channel of the insole

Filling in the space under the insole and within the edges of the stretched upper is an interesting operation, and the cork and wax preparation for this is heated in a tank fitted with electric elements. Later the soles are put on and moulded (stuck), and on a rounding machine the sole is shaped to the last and channelled. Then the channel is opened and the sole is stitched in a machine which carries, like many other similar equipments we saw, a small electrically heated wax container by which the thread is treated. After latexing the channel and closing it down the shoe is then levelled and afterwards is dried in electrically heated cabinets. A battery of 5 cabinets, each about 5 ft. high, 3 ft. wide and 4 ft. deep, is served with hot air from a central air-heating chamber in the trunking system. This chamber is equipped with 14 kW of spiral elements arranged sectionally across the chamber so that a motor-driven fan blows air over the elements on its way to the drying cabinets. The heaters are thermostatically controlled from the chambers themselves.

The heels are then attached and the shoe is passed to the slugging machine, on which a wire fed continuously to the point of operation, providing the material for nailing the top leather to the heel, is one of the final operations, as are also heel trimming, scouring, and forepart trimming in which the sole edge is subjected to treatment by cutters which revolve at a great speed. Heel padding and auto-edge setting are two more operations which embrace electric heating, and in the latter the process is that of a vibrating hot iron about the edge of the sole. The handling of the shoe by the machine itself to receive this treatment is as near human movement as any machine operation we have ever seen.

Among the finishing operations there is stamping on a machine in which the stamp is heated, machine cleaning and polishing, and subjecting the uppers to hot blasting, a process which has superseded hot ironing for the removal of creases. The hot blast is provided by a motor-driven compressor and a similar equipment serves spraying booths in which the shoes receive their final lustre.

The factory is warmed by 24 British Trane water-heated unit fan heaters which are fed in groups of three from separate fuse boards, each board being controlled by a thermostat through a contactor. A single-pole short-circuiting switch is connected across the thermostat terminals, so that the equipment can be used for cooling during the summer. The hot water is supplied by an Ideal industrial boiler, with automatic coal feeding and draught. One 3-HP Crompton Parkinson motor drives both the worm coal conveyor and the fan, and

is controlled *via* a contactor by a thermostat on the boiler itself. Two hand-operated 1.75-HP "Mopumps" circulate the hot water through the system and the motors are served by E.P.L. push-button starters. Lighting throughout the factory is effected by "Saaflux" Benjamin fittings with glass-steel diffusers.

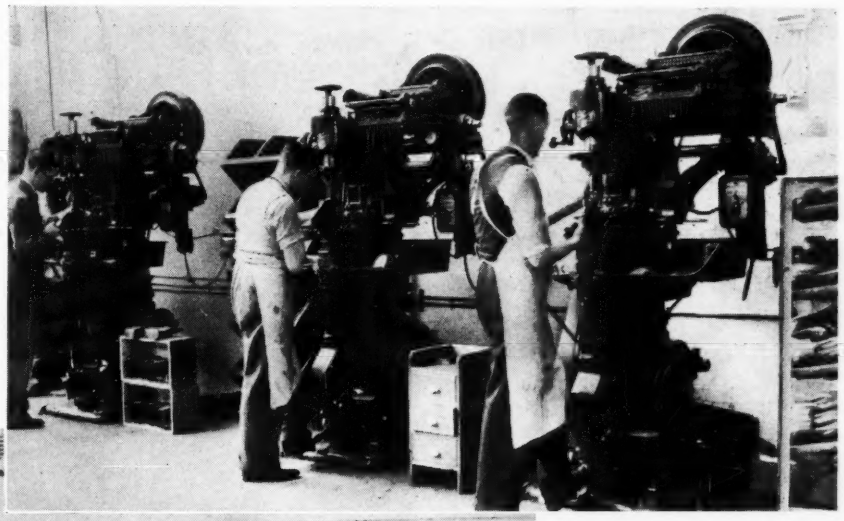
We were particularly impressed by the lay-out of the electrical installation, not only for its neatness, but for the facilities provided for straightforward runs on both the original scheme and for extensions. Supply from the Rushden undertaking is received at 11 kV at a sub-station on site where there are three Ferguson Pailin e.h.v. cubicle units, one serving a 400-kVA, 365/210-V transformer (British Electric Transformer Co.). The low-voltage supplies to the main distribution centre are taken through English Electric high-rupturing-capacity cartridge fuses in a sheet-metal chamber. The power supply from the sub-station is conveyed by two 0.2-sq. in. 4-core cables in parallel and the lighting supply by a 0.75-sq. in. 4-core cable. These cables are wire armoured, lead covered and paper insulated, and the two power cables terminate in a combined sealing and disconnection chamber whereby they can be split if necessary.

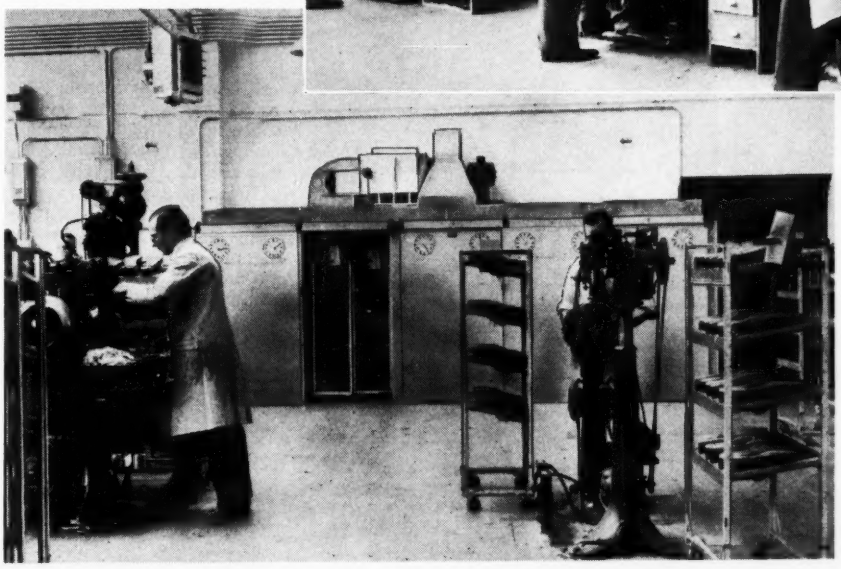
From both end boxes v.i.r. cables on porcelain cable brackets are taken to the power and lighting circuit-breakers, respectively, on the main distribution board. These Johnson and Phillips pedestal oil circuit-breakers have capacities of 600 A and 150 A.

The main distribution board is a neat and robust affair designed and built by the Central Electric Co., which was responsible for the complete electrical installation. It comprises M.E.M. iron-clad switch and fuse units built up on an angle-iron frame, and at the lower part there is a large enclosed bus-bar chamber with $1\frac{3}{4}$ in. by $\frac{3}{8}$ in. bare copper bars mounted on porcelain insulators carried by "Sindanyo" strips in the power section. The switch fuses for power and heating supplies are triple-pole and neutral units of 60 or 30 A capacity, and each supplies either a section fuse board or a distribution board in the works. The lighting switch fuses are all 30-A d.p. equipments with the exception of those for pilot and display lighting, which are triple-pole and neutral. Above the switch units at the top of the board and below the bus-bar chamber there are separate metal trunks facilitating cable runs.

On the other side of the wall to which the distribution board is mounted is secured another line of trunking similar to those on the board itself. Cables from the board enter this trunking, from which the various circuits radiate—an excellent scheme for facilitating circuit runs. Distribution from this ducting is either by wire-armoured, lead-covered, paper-insulated cable or by v.i.r. in screwed conduit, the former for trench runs and the latter for surface work. The lead-covered cable take-offs are arranged by means of inverted flanged sealing boxes which are bolted to the trunking.

Most of the works section and distribution boards are secured to the factory walls, but in the lasting room there is, we believe, a unique scheme of distribution. Here the machinery lay-out is liable to change at any time; this is provided for by floor-mounted distribution cabinets (Central Electric Co.) above a cable trench





Above: A battery of heel-attaching machines. Left: Electrically heated drying cabinets

(18 in. wide and 4 in. deep) in the floor and served by the armoured cables referred to. Each cabinet consists of either one, two or three banks of fuses at respective sides of the chamber at the bottom of the cabinet. Up to 10 sets of fuses are accommodated by each bank. In the top of the chamber is an isolating switch and a local power-factor correcting condenser.

At right-angles to the main trench other floor trenches carry v.i.r. cables in conduit from the fuse chambers to G.E.C. switch-fuse units with four-pin interlocking plug sockets at the top. These are mounted on the projecting conduit a few inches above the floor, and each of the factory machines in this room takes its supply from one of them.

Special arrangements have been made to take the light load supplies, *i.e.*, the unit heaters, boiler-house auxiliaries and display, pilot and office lighting, off a separate supply direct from the town system when the factory is closed down. This secondary supply is in a separate distribution chamber, and is connected to the various factory circuits by means of change-over switches on the main and sub-main boards.

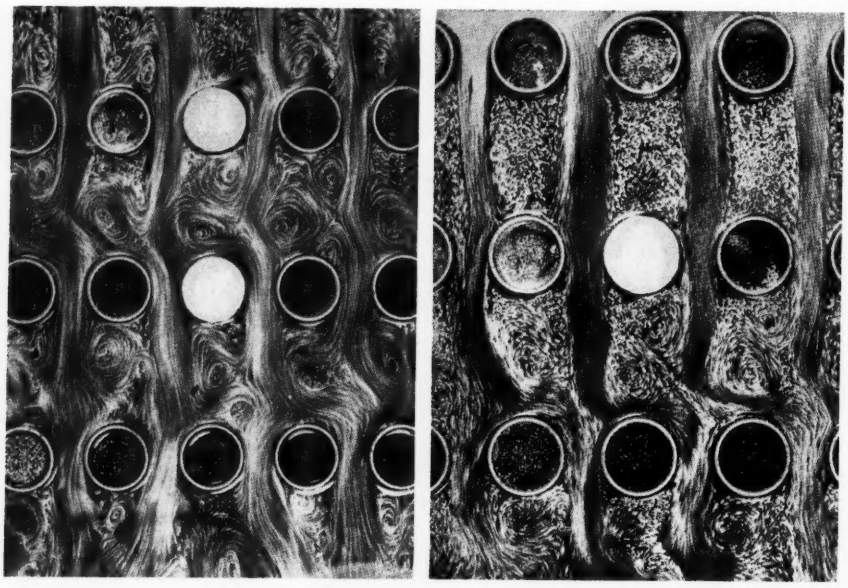
We are indebted to Mr. B. H. Toms, a director of John White (Impregnable Boots), Ltd., and Mr. W. C. Timpson, of the Central Electric Co., for their help in compiling these notes. Mr. Timpson has been responsible for the design of the complete electrical installation scheme.

FLUID FLOW STUDIES

Ingenious Photographic Method

PHOTOGRAPHS which disclose the form of motion of a fluid among nests of tubes are capable also of indicating how the flow can be controlled by varying the arrangements, pitch or shape of the tubes. This is a matter of importance to all who are concerned with heat transfer problems, such as boiler makers and, indeed, designers of most kinds of heating and cooling plant.

A study of the subject by Dr. R. Pendennis Wallis (E. Green & Son, Ltd., fuel economiser manufacturers), which has been contributed to the *Proceedings* of the Institution of Mechanical Engineers describes experimental work done in the Civil Engineering Department of the Imperial College, London,



Left: Result of short exposure and liberal supply of aluminium dust. Right: To disclose the whole of the flow in this fashion as much powder as possible is used, with a longer exposure

by directly photographing moving specks of aluminium dust sprinkled on the surface of water flowing from end to end of a tank containing nests of fixed tubes.

The employment of this, the Ahlhorn, method avoids the need for any specialised equipment and is simple and easy provided care is taken with regard to certain details which may appear to be insignificant. The necessary water speeds, degree of illumination, camera exposure and other relevant conditions are detailed in the first half of Dr. Wallis's paper.

For example, the conditions suitable for obtaining useful photographs are: (1) a black cloth background covered with glass; (2) an illumination of about 400 lumens per sq. ft. for 18/10 deg. DIN. plates and a camera aperture of F.16; (3) the camera lens aperture to be varied inversely as the square root of the speed in that part of the flow of chief interest and no account to be taken of shutter speed; (4) shutter speed to be $d/8V$; (5) with a small amount of aluminium dust the photographs show specks and streaks of varying lengths, indicating local velocities, whereas more powder discloses the whole flow pattern readily to the inexperienced eye; (6) the image on the plate to be of suitable size for printing in an enlarger, in order that part of the field can be picked out from distracting surroundings: contact printing is quite impracticable.

The water speed should not be greater than 5 cm. per second, or less than that due to possible thermal circulation, induced by evaporation and assisted by the heat of lamps required for photographing.

The second half of the paper, which is illustrated with reproductions of actual photographs, shows how the effects of transverse and longitudinal pitch in both parallel and staggered nests of tubes have been investigated.

There is a warning that photographs specially taken at a suitable speed and with a small amount of aluminium powder disclose that the speeds of the eddies in the dead water region often reach half that in the gap and are considerably greater than that in the original free stream. It is important to bear this in mind, particularly in connection with the application of the present work to heat transfer problems, for otherwise the term "dead water" might misleadingly suggest that the part of the tube wall in contact with it transferred no heat. In fact actual experiments by other workers have shown that in the case of a circular cylinder one of the most effective heat transfer portions of the surface is that in contact with the dead water region. It is paradoxical features such as this which make the interpretation of observed flow patterns a matter requiring care and experience.

Some of the author's conclusions are that with parallel arrangements the main stream flows with continuous high speed in the flow lanes and retains a definite individuality as distinct from the eddying motion in the spaces behind the tubes. The result of increasing the transverse pitch is to reduce the velocity in the flow lane and, in consequence, the mean speed in the eddies. The number of eddies present in the dead water regions is to some extent determined by the longitudinal pitch: when this equals 1.8 diameters two large eddies are usually present, whereas with a longitudinal pitch of 2.6 diameters, three or even four eddies can be seen simultaneously. With longer longitudinal pitch the eddies are less rigidly held at the back of the tubes and float more freely downstream.

Such motions also occur in staggered nests unless the transverse pitch is less than twice the longitudinal one: with less transverse pitch the dead water regions are constricted and no longer extend from one tube to the tube directly behind it. In the extreme case with close pitching the dead water appears only as a very small triangular prism attached to the back of each tube. Both for circular and elliptical tubes particular spacings were found in which the dead water was a minimum and the main stream flowed without noticeable eddying.

Photographs taken in this way are apparently reliable from a qualitative point of view and seem true also in many quantitative respects, which is rather surprising in view of the restriction which the free surface must have on any vertical component of the motion.

National Central Library

IN times of peace the British Isles has, in addition to a public library service, a system of library co-operation under which all persons requiring books for any serious purpose are able to obtain them through their local public, university or other library.

The keystone of the system is the National Central Library which, in addition to being itself a great lending library, is the centre for the inter-lending of books between one library and another. The service is available to every branch of the community. During the war the national library service will also be of great value to Government departments, organisations and persons needing special literature in connection with work of national importance. Most of the important libraries having material of research value are already associated with the National Central Library, but it is hoped that any such library not already contributing to the service will communicate with the Library.

Owing to the risk of the destruction of property at the headquarters in London, all the union catalogues as well as all other irreplaceable or scarce bibliographical material have been removed to Hemel Hempstead. The non-bibliographical books are remaining at the headquarters in Malet Place, W.C.1. All applications for books or bibliographical information should be made through the reader's local library, but correspondence on any other subject should be addressed to the National Central Library at Bourne Lodge, Bourne End, Hemel Hempstead, Herts.

THE I.E.E.'s HISTORY

A Review of Mr. Rollo Appleyard's Interesting Narrative

By Alexander Russell, M.A., D.Sc., LL.D., F.R.S.

SEVERAL of those associated with the Institution of Electrical Engineers thought that it would be useful, instructive and interesting if an official history of the Institution were written. After consideration by the Council it was decided to confine the history mainly to the sixty years from 1871, when the Society of Telegraph Engineers was founded, to 1931, the year that marked the centenary of the discovery by Michael Faraday of—to use his own words—"the evolution of electricity from magnetism."

These limits were suggested with the understanding that it would be necessary to take preliminary bearings upon early electrical knowledge and sometimes to refer to advances later than those of the 1871-1931 period. Commander Rollo Appleyard was appointed editor and the preparation of the history took about three years before the first proofs were available for examination by the History Sub-Committee which had been specially appointed. The book has been published this month.*

Commander Rollo Appleyard, O.B.E., J.P., the author of the History

In the introduction the author tells how a voluntary association designated "The Society of Telegraph Engineers" came into existence. The first meeting to consider the expediency of forming such a society was held at No. 2, Westminster Chambers, Victoria Street, S.W., on May 17th, 1871. The minute book contained the following eight names, who may therefore be designated the founders of the Society—W. Whitehouse; Captain P. H. Colomb, R.N.; Major R. H. Stotherd, R.E.; Louis Loeffler; Captain C. E. Webber, R.E.; Captain E. D. Malcolm, R.E.; Robert Sabine; and Major Frank Bolton.

A meeting on May 31st was held at the same address, when eleven members were present. Lord Lindsay was voted to the chair. As a result of the ballot for the first council C. W. Siemens was elected president and Lord Lindsay and F. I. Scudamore vice-presidents.

Sir Charles Siemens, F.R.S. (1823-83), was a famous metallurgist and inventor, born in Hanover and naturalised in England in 1859. With his brothers, he established electrical works at Charlton, Kent, in 1866. Lord Lindsay (1847-1913) was a F.R.S., an expert in astronomy, geophysics and applied electricity. F. Ives Scudamore (1823-84) was Receiver and Accountant-General of the Post Office, 1856, and Formulated Savings Bank, 1861. In 1880 the title of the Society was broadened to "The Society of Telegraph Engineers and of Electricians." In 1888 it became simply "The Institution of Electrical Engineers."

Early Discoveries

In the introduction it is pointed out how slow was the progress of experimental philosophy in ancient universities prior to the nineteenth century. During the two centuries that began with Gilbert and included Newton, the scarcity of the applications of electricity and magnetism to engineering or to any of the industries was probably due to the restriction of thought and teaching to electrostatic phenomena. During the year 1800 the means devised by Volta for the production of continuous electric currents thrilled the world.

In 1822 Ampère demonstrated that two electric currents exert force on one another. In 1821 Seebeck, in Berlin, by heating a junction of bismuth and copper, discovered thermo-electric currents, and in 1821 Sir Humphry Davy produced an "arc of voltaic flame" about 2½ in. long in an exhausted receiver.

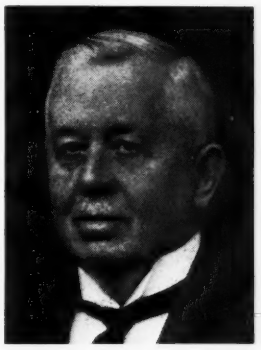
In 1771 a group of professional men known as "The Society of Civil Engineers," otherwise the Smeatonians, established themselves as a fraternity to cultivate good companionship. They held their meetings at the King's Head in Holborn and spent special evenings in profitable conversation. After shutting down for a year in 1792, it was resuscitated in a better form at the Crown and Anchor in the Strand, not far from the present site of the Institution of Electrical Engineers. Telegraphy, both submarine and overland, provided boundless opportunities for investigation.

The decade 1861-71 justified all hopes. While the Atlantic was being explored for safer routes financiers were busy seeking capital and mathematicians were discussing the speed of signalling that could be attained with various types of submarine cable. Important manufacturing companies were incorporated for the construction and maintenance of wires and cables.

In 1865 an Atlantic cable expedition equipped with many improvements ended in failure. But in 1866 the Atlantic was conquered, for an additional cable was laid and the old cable was picked up. By 1887 the Council of the Institution was able to report that the Proceedings were printed clear of arrears and that the Society had enrolled amongst its members almost everyone who had advanced to fame in the realm of electrical science.

In 1875 Mr. William Crookes requested permission for a reporter to attend the Society's meetings during the ensuing session and this was given. There was now a demand for the more rapid distribution of the particulars of new discoveries. Questions on theoretical and practical points connected with electricity were discussed at length in the law courts. One of the most distinguished barristers, J. Fletcher Moulton (afterwards Lord Moulton, 1844-1921), became a candidate for the Associateship. In the most momentous patent actions of the time, including early telephony and electric lighting, he took the foremost part.

In 1873 Willoughby Smith described the variation of the electrical resistance of selenium exposed to the action of light. The discovery was made during tests on submarine cables, when he was searching for a substance of high specific resistance. The year 1873 has also to be remembered because of the discussion on the block system of working railways which was opened by W. H. Preece and Captain Mallock.



Dr. Alexander Russell joined the I.E.E. in 1899. He was President in 1923 and is now an honorary member

On January 4th, 1874, Sir William Thomson delivered a presidential address directing attention to the remarkable rate of the development of the Society in numbers, usefulness and popularity. He declared that in no other branch of engineering was high science more intelligently appreciated and ably applied than in the manufacture and use of telegraphic lines whether overland or undersea.

Prof. Alexander Graham Bell began his experiments upon the electrical transmission of sound in October, 1872. On June 2nd, 1875, he transmitted musical tones electrically without using a battery. A year later Sir William Thomson saw a demonstration of Bell's telephone at Boston (Mass.). Bell presented the instrument employed in the demonstration to Thomson, who showed it to his class at Glasgow University on his return and also to the British Association who were meeting at Glasgow in that year.

The state of electrical knowledge in 1881 can be obtained from the scope of the electrical literature obtainable by its members. Faraday's *Experimental Researches in Electricity* published in 1855 formed the basis of academic and practical learning. Ganot's Physics in 1866 and Deschanel's Physics in 1872 were very well known. Fleeming Jenkin's text-book (1873) was highly appreciated. Fleeming Jenkin became acquainted with Sir William Thomson in 1859 and they carried out several important investigations together. From 1862 he was secretary of the Electric Standards Committee of the British Association and was appointed Professor of Engineering at University College in 1865.

The electrical profession and industry have always been fortunate in having excellent journals to report all the latest discoveries and all matters of interest to electricians. In

* Present price 12s. 6d. to members and 18s. 6d. to non-members. Members overseas who send order with remittance to the Secretary by January 15th can still obtain the first copy for 7s. 6d.

November, 1872, the *Telegraphic Journal and Electrical Review* was first published. In 1892 the title was shortened to the ELECTRICAL REVIEW. Under the proprietorship of Alabaster, Gatehouse and Kempe this periodical formed a useful link between the technical and social features of professional and industrial life in the electrical world of the period. Mr. Gatehouse with his violin greatly pleased the electrical fraternity at their concerts. The *Electrician* had at one time A. P. Trotter as its editor, who was always ready to give advice to his contributors. Another journal was *Lightning*, now called the *Electrical Times*. It is described as the popular and business review of electricity. Under the control of Robert Hammond it directed attention to vital statistics of the industry and carried conviction with knowledge and wit.

Prof. J. A. Fleming in 1885 pointed out that it was necessary that the country should have a national physical laboratory. Electrical energy was a marketable quantity, but there were no facilities for putting a mark of efficiency on it. Prof. Ayrton warmly supported this advocacy. He said that a testing laboratory was urgently wanted but there must be provision for original research.

Mr. E. G Tidd, a student of the Institution in 1888, did useful service by bringing to notice the adaptation of electric lighting for use in theatres. The Savoy Theatre was the first to adopt electric lighting on October 10th, 1881. During the performance of "H.M.S. Pinafore" it had 715 white electric lamps and 601 blue ones. In Terry's Theatre, owing to the fluctuating nature of the electric light, a supply of gas lamps at a blue flame was kept in reserve in case of failure.

At the Council meeting of the Institution on November 24th, 1887, it was proposed by W. H. Preece, seconded by Alexander Siemens, and carried unanimously, that the title be altered to "The Institution of Electrical Engineers."

In 1889 developments began that showed electrical science leading a beneficent crusade for general welfare. Devices were created to reduce physical toil, to relieve distress in myriad forms, to give light and fight disease, to annihilate space and save time. The transformation from a society to an institution took place on January 10th, 1889, when Sir William Thomson, as first president of the Institution, gave his inaugural address. He took as his subject themes that were engaging the attention of scientists at that time, namely, "ether, electricity and ponderable matter." After doing justice to the pioneers he discussed the effect of electromagnetic induction in a circuit.

Wireless Telegraphy

In 1898 Oliver Lodge read a paper on "Improvements in Magnetic Space Telegraphy." Then followed a paper by G. Evershed and a communication by W. H. Preece on "Ætheric Telegraphy." These contributions, together with those of Dolbear, Willoughby Smith, Marconi and Tesla, brought wireless telegraphy within the sphere of electrical engineering.

The transition from commercial wireless telegraphy, originating about July, 1897, to commercial wireless telephony that came into service in 1922 was in some respects retarded and in some accelerated by the incidence of war. The American Telephone and Telegraph Company in 1915 established wireless speech communication between the United States wireless station at Arlington and the Eiffel Tower in Paris. At the cessation of hostilities experimenters obtained licences to receive and send telephonic speech. The results exceeded all expectations and, at first, all belief.

The British Broadcasting Company had been formed in November, 1922. Great Britain was the first nation to give to a single authority the conduct of a national service for broadcasting. The Institution let to the B.B.C., Ltd., several rooms at Savoy Hill. J. C. W. Reith was appointed general manager of the company in December, 1922, and was temporarily settled in Magnet House, the quarters of the G.E. Co. Sir William Noble, who was the chairman of the Broadcasting Committee, was busy seeking premises for the rapidly increasing staff. The Marconi engineers stipulated that the desired new premises, to contain the studios and offices, must be within a mile of Marconi House, because they were uncertain what difficulties might arise in transmitting music over a land line of greater length. Rooms were secured in the Institution Building at No. 2, Savoy Hill. The Marconi House studio continued in use until May 1st, 1923, when the Savoy Hill studio was first brought into service.

It soon became a hive of activity, but one Sunday afternoon in the summer of that year there was a portentous lull. Someone had forgotten the key of the front door. The "programme" was twenty minutes late. This, we are told, initiated a new source of pleasure to the world—writing to the Press to complain of the B.B.C.

Anglo-American Conference

In July, 1926, the Government accepted the recommendation of the Crawford Committee that the service should be conducted by a public corporation. In 1932 the B.B.C. built for themselves headquarters in Portland Place and after a prosperous nine years the studio at Savoy Hill was relinquished. In 1928 a radio-telephone conference took place between 400 members of the Institution in London and about 1,000 engineers who were attending the annual conference of the American Institute of Electrical Engineers in New York. Sir Archibald Page was appointed chairman of the international meeting and an interesting conference was held, loud speakers being used.

A very interesting historical account of "The Precincts," that is, the present site of the Institution in Savoy Place, Victoria Embankment, is given in the last chapter. The author reviews memories of the Plantagenets, of the "Manor of the Savoy," and of Peter of Savoy from whom it takes its name. Photographs of the Presidents from 1871 to 1938, with brief biographies of them all, are given. Photographs of the four secretaries of the Institution from its foundation are also included. Perhaps the best known of all those connected with the staff of the Institution is Mr. Percy F. Rowell, who has just retired after thirty years of continuous work as secretary with the good wishes of everyone.

In a review it is only possible to mention a fraction of the members who have shed lustre on the Institution, but so thoroughly has this work been done that it will make the work easy for subsequent historians. We congratulate the author and also the sub-committee and those of the staff who helped with the historical researches on the result.

Deformed Rotor Windings

A FRESH explanation of the reasons why the rotor windings of turbo-alternators of great length have been deformed seriously in the axial direction by a comparatively small increase in temperature rise is given by Mr. G. A. Juhlin (Metropolitan-Vickers Electrical Co., Ltd.) in a paper published, without being read at a meeting, in the "Journal" of the Institution of Electrical Engineers for October. While the cause has previously been referred to, the reasons why only a part of the winding has been affected have not before been explained. In a large turbo-alternator that developed vibrations a certain number of the coils had distorted in a peculiar manner which had not been experienced previously; some of the turns had become shorter on certain coils only, whereas other coils were not affected at all.

The top turns—those nearest to the periphery—were not affected, the deformation having taken place on the lower portion of the coils. At first sight it appeared inexplicable that such deformation could occur, and no reason could at first be found which would explain why some turns in the same slot should shorten and others not, but investigation shows that the phenomenon is due to a combination of temperature expansion and centrifugal forces, the latter exercising a restraining influence which prevents free expansion of the copper during running, causing stresses above the elastic limit.

This restraining force is removed when the machine comes to rest, but permanent distortion which has taken place during running remains, and is repeated each time the machine is started and stopped, so that although the distortion each time is small, repeated starts and stops increase the deformation until in some cases it becomes larger than the clearance between individual coils, and short-circuits occur.

The author, who acknowledges valuable suggestions made by Dr. Bernard Price, of Johannesburg, S.A., employs a graphical method to determine whether a given temperature rise will cause the deformation to become serious. He takes into consideration the effect of different methods of applying excitation, and also examines suggested modifications of the normal method of starting-up and shutting-down a machine, pointing out that any preheating, even if the temperature rise is below half normal, will be an advantage as it reduces the amount of copper conductor shortening.

The use of hard copper, or annealing the slot portions of the coils up to 6 in. from each end (machines are now being built in this way) are not the only solutions. The alternative is to provide means of limiting the contraction of the copper. This can be done by additional blocking support for the ends of the coils. Duplicate machines have not all suffered in the same way, which emphasises the fact that small differences between individual machines and operating conditions have caused the trouble to appear in some cases but not in others.

PROBLEMS IN THE TROPICS

Line Construction through Jungle and Rubber Plantation

INTERESTING facts concerning the provision of electricity supplies in tropical Malaya are recounted in the latest annual report of Mr. H. R. Sparrow, M.I.E.E., Adviser on Electricity, Malay States.

Overhead line construction presents problems, owing to the nature of the country, which consists mainly of dense jungle, rubber plantation and rice padi field. For example, a recent electrification scheme requiring the erection of a 66-kV double-circuit transmission line in Selangor necessitated the clearing of a reserve of two chains wide through 14 miles of jungle between Kuala Lumpur and Klang at a cost averaging £7 per acre—a fairly low figure considering the density of the vegetation.

Once cleared the ground has to be kept clear, which is no small task. In one instance a stretch of line reserve was left unattended for a few weeks, and during this time the open reserve became a veritable banana plantation, with undergrowth so dense that it took the engineer in charge five hours of strenuous walking to traverse between four and five miles.

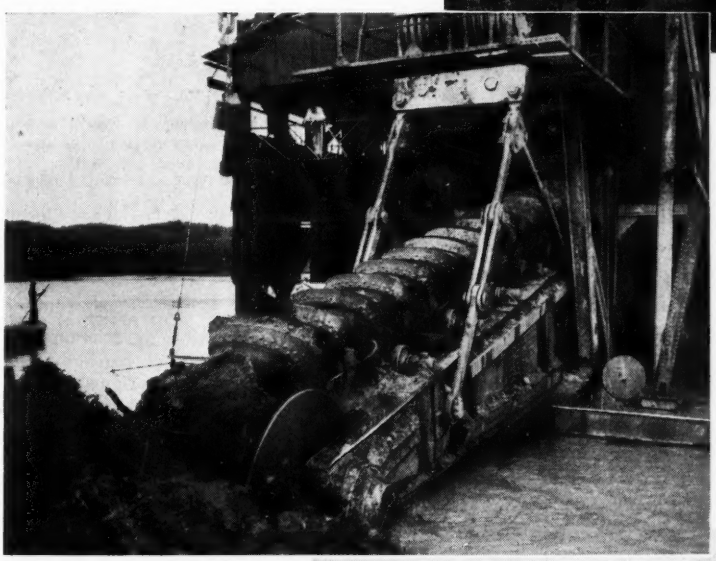
Besides jungle, the route of the new Kuala Lumpur-Klang transmission line passes through large rubber estates and compensation for felling the trees ranged between £50 and £80 per acre, according to quality of rubber. Transport constituted a major difficulty, the component parts of the line comprising as many as 240 packages of a total weight of 19 tons per route mile. In many instances the towers had to be carried three or four miles through the jungle by workmen, and it is estimated that to transport the 263 tons of steel for the 14 miles of line the men traversed approximately 121 miles of rough jungle paths; the cost of this work alone averaged £3 per tower.

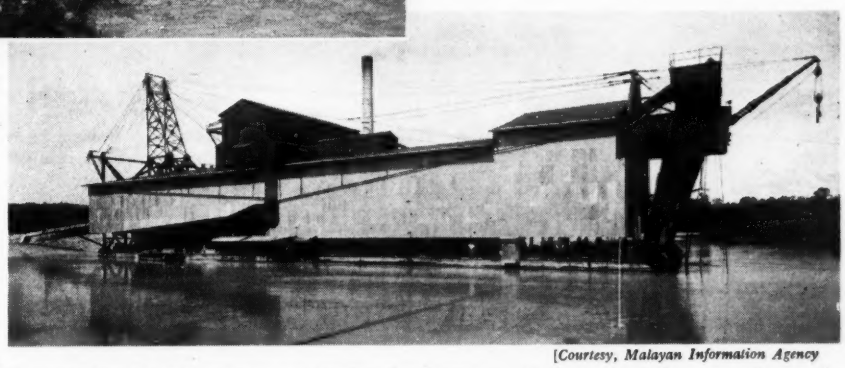
Maintaining the continuity of supply also presents many difficulties owing to the severe elemental conditions prevailing. The Government Electrical Department has for some years been considering ways of dealing with the number of momentary interruptions from transient faults caused by flashes of lightning setting up surges on the transmission lines, and apparatus has now been installed at the Bungsar power station to prevent such interruptions.

At the Bungsar station, the largest owned by the Department, extensions have just been completed which constitute, in effect, a completely new station. With the latest 12,500-kW set the installed capacity is now 31,500 kW. Small Diesel generating plants have also recently been completed at Kuala Kubu Bharu, Bentong, Mentakab and Fraser's Hill.

The output of electricity in Malaya is largely dependent on the tin industry, and last year mining operations were slowed down by severe cuts in the quota under the tin restriction scheme, although since then these have been relaxed. Thus the total output of electricity in the four Federated States during 1938 decreased from 521.0 million kWh in 1937 to 375.4 million kWh last year, Government supplies dropping from 91.0 million to 71.5 million kWh. This dependence on tin mining tends to make planning difficult and attention has in recent times been paid to the development of more stable loads. That some measure of success was achieved last year is borne out by the fact that most supply stations recorded increased sales for purposes other than tin mining, and at every Government station throughout the F.M.S. there were increases in load connected, number of consumers and revenue.

Typical Malayan scene





Tin mining is the principal industry. Above is shown a dredger cutting into the working face, and on the right is illustrated the largest tin dredger in the country

[*Courtesy, Malayan Information Agency*

During last year notable progress was made in the adoption of air conditioning, and in this field there seems to be every prospect of extensive development. At the end of the year schemes for installations in a cinema, hotel and new offices were being carried out. Street lighting is another matter receiving attention, and improvements at Kuala Lumpur last year included the erection of 140 mercury electric-discharge lamps. A.R.P. master switches are being provided to control sections of the town's lighting. At Ipoh sodium lamps have been installed as well as mercury, and experiments with both forms were undertaken at Taiping. On the industrial side a new electrically operated dredger representing 2,188 HP was connected.

(*Continued at foot of next page.*)

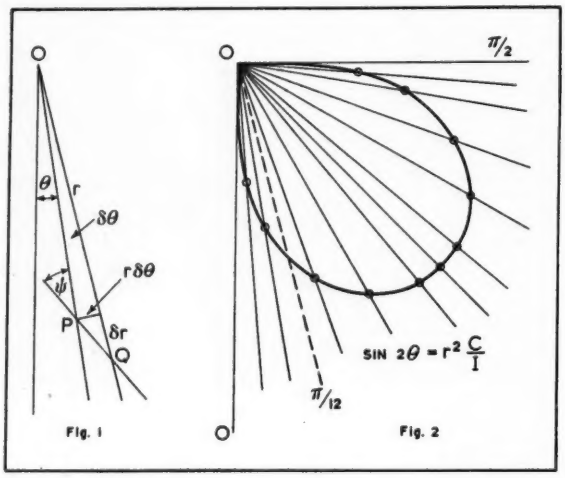
WARTIME STREET LIGHTING

By D. G. Sandeman, B.Sc., A.M.I.E.E.

(*Public Lighting Superintendent at Stepney*)

THE Home Office has rightly decided that all ordinary public lighting must be suspended until a system is discovered which can safely be left in operation even during an air raid. There appears to be a call for such lighting in order to minimise road accidents and for other reasons more difficult to define. Public lighting costs at 2s. to 3s. per head per annum in peacetime cannot be said to be extravagant, and would be very much less in the black-out with low intensity lamps in use.

The difficulty confronting the designers of lighting fittings



Figs. 1 & 2.—Method of determining shape of pylon

is that a wet road acts as a mirror. However well a lamp may be screened the image of the lantern appears on the road surface when viewed from above in wet weather. Low-lying mist may also reveal such lamps. There is no way out of this difficulty when attempting to use lanterns of ordinary dimensions. The solution would appear to be in the use of backgrounds, such as dimly lighted shop windows, or dimly luminous pylons. The illumination should be of the same order as the reflection from a light-coloured object in moonlight.

Should the use of fluorescent paint and ultra-violet equipment be ruled out on the ground of cost, it would still be possible to design a luminous pylon for the almost perfect diffusion of light, although using only one small lamp. I refer to a pylon having a tier of white concentric washer-shaped baffles, each designed to intercept and diffuse its fraction of the central beam. A wooden structure covered with oiled silk, cotton or canvas and placed conveniently to an existing lamp column or other source of supply is all that is required.

A simpler method of securing a perfectly even illumination over a large pylon from one small lamp is by employing a suitably shaped envelope without any baffles. This shape is

Scale model representing motorist's view of pylon

derived as follows:—Referring to fig. 1, the condition for constant illumination at point P distant r from the light source of candle power I at 0 is

$$\frac{I}{r^2}\sin\psi = C \qquad \frac{I}{r^2}\cdot\frac{r\,d\theta}{\sqrt{(r\,d\theta)^2+(dr)^2}} = C$$

$$\text{From above, } \theta = \tfrac{1}{2}\sin^{-1}\frac{r^2C}{I} + K.$$

This curve, illustrated in fig. 2, is symmetrical about $\theta = \frac{\pi}{4}$. Looking carefully at the completed curve, it would appear that the portion most suited to our purpose is between $\theta = 0$ and $\theta = \frac{\pi}{12}$ The model photographed was constructed of perforated zinc from this portion of the curve, the scale being 1 in. equals 1 ft. The illuminated height represents 8 ft. In spite of considerable departure from the ideal or point source of light, the model proved successful, giving a perfectly even brightness, reminiscent of a gas mantle barely filled by a flame. The proposal is to use two of these pylons at every pedestrian crossing in the positions shown in fig. 3. The photograph represents a motorist's view, but too much detail is shown owing to over-exposure. At 100 yards distance the pylon would just appear as a dull glow, and after slowing down the motorist would see pedestrians in silhouette. Sheets

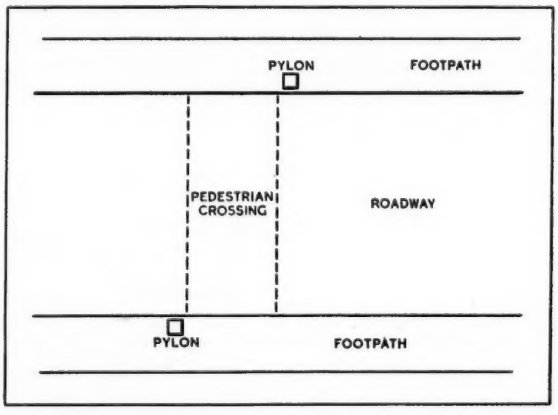


Fig. 3.—Suggested positions of pylons at pedestrian crossings

of expanded metal cut to shape and welded along the edges would form a robust structure.

In the ELECTRICAL REVIEW of July 21st, 1939, there was an article on "Public Lighting by Luminous Pylons" as a full-scale peacetime system. It has some advantages over the ordinary method. Shop windows, while of importance, are not so useful in revealing the pedestrian stepping off the kerb, or preparing to do so, as are the pylons. Advertising by means of semi-opaque blinds and dimly luminous shelves would be welcomed by traders.

Problems in the Tropics

(*Concluded from previous page*)

Only six fatal and three non-fatal electrical accidents were reported and investigated during the year. This comparative safety under arduous conditions is due to the employment of certificated wiremen, chargemen, and electrical engineers. According to Government Supply Rules, only registered contractors may carry out domestic installations, and periodical tests of installations are also undertaken. All meter readers are expected to report any extensions or connections likely to be dangerous.

The total revenue of the Department last year amounted to $3,242,667, a decrease of $354,024, while expenditure increased by $12,803 to $2,501,160, the net surplus being $741,508. At the end of the year the total capital invested in the Department's undertakings was $16,715,874.

Of the total Government supplies (71.5 million kWh), 64.2 million kWh was generated at the Bungsar (steam) and Ulu Langat (hydro-electric) stations, on which the maximum load was 13,160 kW, and the load factor 55.73 per cent. At Bungsar 2.674 lb. of coal was used per kWh sent out, and the total cost increased from 0.953 cent to 1.074 cents. At Ulu Langat the cost rose from 0.180 cent to 0.209 cent.

INSTITUTION PROCEEDINGS

National Engineering College Proposed. A.R.P. at Mines

Engineering Education

PRESENT-DAY facilities for engineering education in relation to professional institutions are discussed in the address prepared by Prof. S. Parker Smith (Royal Technical College, Glasgow) as chairman of the Scottish Centre of the Institution of Electrical Engineers.

First, the educational requirements for corporate membership of the I.E.E. are indicated in order to stress the importance of all engineers in training following recognised courses. These should conform to the I.E.E. requirements, provided that the latter have been formulated with due regard to the ability of colleges to give them effect. In the absence of conformity, adjustment is needed, for corporate membership of his professional institution should be the aim of every newcomer.

In considering how far full-time college courses satisfy the needs of the I.E.E. and of practice, Dr. Parker Smith says that the majority are not of honours standard and that four years is too long a period to spend at college. What the average engineer needs is a more general training, but universities are seldom staffed or equipped for both degree (four year) and diploma (three year) courses.

Large technological institutions, equipped for the needs of evening students, can offer such alternatives. This fact opens up new possibilities; economy and many other advantages would accrue from their conversion into the technological departments of universities, so withdrawing engineering from the colleges which train students for the teaching, legal, medical, and other professions. Generally, an engineering course is a heavy drain on university funds, and the cost per student is out of all proportion to the cost per student in the arts and science departments.

It is doubtful whether the normal educational institutions should attempt too much research and specialisation. Their proper function is to educate students; large-scale and long-term engineering investigations are essentially a matter for the works, for development departments, and for research institutions. The limited resources of a college soon become apparent, though much useful measurement and testing can be done. A practical approach in colleges is to train selected men in the methods of research. Apart from other difficulties, there is a costly possible danger of depriving undergraduates of proper tuition. The objections to specialisation in undergraduate courses are that essential matter is likely to be crowded out, since only in rare cases does a young engineer know what his future will be.

Need for a National College

Obviously, there is a need for a national college where only advanced, post-graduate, and specialised work would be done by students recruited from all parts of the kingdom. As these would be selected for their ability to continue higher studies or carry out original investigations, their services would be properly conserved for the community. In many ways the Imperial College of Science and Technology would meet such requirements.

The teaching of engineering is best done by those who have had professional or practical experience as engineers, otherwise the commercial side may be overlooked. National certificates issued by professional institutions in collaboration with the Board of Education and later with the Scottish Education Department are accorded recognition (in whole or in part) as educational qualifications for Institution purposes. The remarkable success of this scheme is illustrated graphically.

For a long time the Royal Technical College, Glasgow, has known that students who worked their way from evening to day classes almost invariably did well, whereas day students sent by their parents were of all kinds. A benefaction enabled the College to award bursaries to assist in the transfer from evening to day classes, and the result has been wholly good.

So far as electrical engineering is concerned, such students seldom return to their former employment, though the placing of them is not always so easy as with students who have yet to serve an apprenticeship. Such transferred students may have to make sacrifices, but the risk for either college or student is practically nil. It is suggested that this is a way in which educational authorities might further help the engineering profession.

It is unlikely that the old five-year apprenticeship course will continue for electrical engineers unless the practical time is included in some sandwich system; also, it is likely that all graduates will be offered a living wage as soon as they leave college.

Careful records extending over many years show that students do best who go straight to college from school. Even firms which prefer youths to start their apprenticeship before entering college nevertheless seem loth to accept first-year students for vacation experience—a contradiction not easy to explain. The genuine evening student should, wherever possible and desirable, be helped to transfer to day courses.

Precautions at Mines

A DISCUSSION on the subject of "Electricity Supply at Mines in Relation to Civil Defence" was opened by Mr. J. F. Smith at a meeting of the South Wales branch of the Association of Mining Electrical Engineers, held at Cardiff on November 18th.

Mr. Smith explained that the title had been carefully chosen to have a wider meaning than that of the Civil Defence Act. Factories and mines must maintain, in the national interest, their maximum outputs of production under all circumstances. It was not for industrial concerns to judge the likelihood of air raids; the danger was a real one, and common prudence called for precaution. Mr. Smith explained what the Central Electricity Board was empowered to do under Sec. 42 of the Civil Defence Act to maintain the function of supply undertakings in the event of hostile attack, including the creation of a stock of typical equipment.

Mr. J. Vaughan Harries dealt with the more direct applications of civil defence as it affected mines. The South Wales coalfield had been divided up by the authorities, some parts being considered more vulnerable than others. The main chances of avoiding a direct hit were by "blacking-out" and camouflage and it appeared from experience gained in Spain that this method of precaution was highly successful.

Mr. Harries strongly urged the necessity for arranging a "pool" of plant and machinery which should be available to all collieries put out of action. Even in the event of a direct hit it would be possible to produce from such a pool at least sufficient plant and spares to have the colliery working again in a few days.

Mr. Taliesin Richards agreed with Mr. Harries on the question of the pooling of machinery and spares. The suggestion was practical and practicable and worthy of serious consideration. Mr. Idris Jones emphasised the importance of keeping the pumps and fans running.

Illuminating Engineering Society

THE first wartime meeting of the Illuminating Engineering Society was held in London on November 14th, when the new president, Mr. F. C. Smith, was inducted by the retiring president, Mr. Percy Good.

In an informal opening address (the presidential address will be delivered at a later date) the new president referred to Mr. Good's services when he was in Australia and New Zealand and established close contact with the Illuminating Engineering Societies in those countries; also to his work at the beginning of the war, when the Society had placed its services at the disposal of the authorities.

They had been accepted with alacrity, and a variety of specific problems had been placed before the Society for consideration. A great deal of work had been accomplished, some of which was already published in the form of British standard specifications. Other specifications were nearing completion and would deal with fluorescent paints and with gauges for checking low illumination.

Mr. C. E. V. Lambert demonstrated an experimental gauge, based on the use of luminescent radioactive paint, for checking illumination of low value. Col. Kenelm Edgcumbe then demonstrated another form of gauge in which comparison was obtained by a plate illuminated by a small filament lamp fed by a dry battery, the illumination on the comparison plate being adjusted by varying the angle of incidence of the light from the lamp.

The Leon Gaster Memorial Premium was awarded to Mr. H. Warren for his paper, read before the Society on the occasion of a visit to Rugby early in the year, entitled "Research on the Production and Utilisation of Light."

The president announced that it was the intention of the Council to maintain the activities of the Society as fully as possible during the war period. A meeting would be held in December to consider a scheme for the establishment of a new class of membership, namely, Fellowship, and for the recognition of a class of fully qualified members. The Society aimed at maintaining the activities of the various local centres.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. - The Editors cannot accept responsibility for correspondents' opinions

Testing Motor Brushes

I WAS interested in the method of using an "Osglim" lamp for measuring slip, mentioned in Mr. G. H. Rawcliffe's article of November 10th on the testing of motor brushes.

The visibility of the marks may be increased by marking one line per pole instead of a single line. An alternative and, to my mind, better method is to mount a card on the end of the rotor shaft bearing one mark per pair of poles. This produces half the number of lines, provided that the lamp is fed with AC and DC together, so that it flashes once per cycle. The reduced number of lines makes counting easier.

In using this arrangement it is essential to make sure that the polarity of the DC is such that the "beehive" glows and not the plate. B. C. LEE.

Westbury, Bristol, *November 13th.*

Sub-supplies

With reference to the leaderette in your issue of November 17th, we rewired a country mansion (the owner of which had scrapped his private plant in favour of public supply) together with two farms, fourteen cottages, the church and the school, all on the estate. The cottages were metered (prepayment) by the supply authority which collected the money and credited it to the estate account. The charge was 3d. per kWh, the supply authority's ordinary flat rate being 7d.

The agreement with the supply authority was for a minimum number of kWh per annum at 1d. per kWh (the cottage supply to be included) plus a fixed charge. The fixed charge was a percentage charge on the capital outlay of the supply authority, which erected all the overhead lines about the estate.

The cottagers' contribution was a distinct asset and the saving to the estate at the end of the first twelve months was an agreeable surprise to the agent, who had been frankly sceptical as to the benefits of the change-over.

Further, the hall now has electric heating, radio, refrigerator and kitchen equipment, and electric lighting has been carried to the stores, squash courts, garages, stables and gardens.

Retford, *November 18th.* E. A. C. HUSBANDS.

Economic Transmission

In your issue of November 17th Mr. Theodore Stevens asks why Niagara power has never yet reached New York. The reason is that chemical and other industries were placed near Niagara (transmission at that date being in a very nebulous condition), and now there is no power to spare. In New York, Chicago, and other places, there is some 18,000,000 kW of generating plant. A base load for this would require between 3,000,000 and 4,000,000 kW and how can Niagara supply this vast quantity—let alone take up any peak load?

I imagine that the actual hydraulic works at Niagara (exclusive of turbines or generating plant) should not have cost more than, say, £6 per kW. The cost of hydraulic works may run into *anything*. I believe the Tennessee Dam cost something like £36 per kW. In the one case, interest and sinking fund charges may run to, say, 0.015d. and in the other to 0.090d. per kWh. When to the latter are added charges on generating plant (including turbines), line, and receiving plant, I agree that we are getting near (if not past) danger point. But if we have only 0.015d. to pay on the hydraulic works and, say, 0.02d. on generator plant (including running expenses) and 0.04d. on line and receiver charges (jointly), we have a total of only 0.075d. per kWh delivered; and this might perhaps be attained if we had more "Niagaras" (there are one or two still left). If the hydraulic works were to cost £12 per kW, the dam charge would be only 0.03d. and the total charge 0.09d. delivered at low-voltage receiver bus-bars—a perfectly workable proposition up to 2,400 miles.

A base-load demand (at 80 per cent. load factor) already exists round New York, Chicago, &c., of quite 3,000,000 kW if power is cheap enough. This depends on the charge at Bonneville, Grand Coulee, &c., as to which I am not concerned at the moment. At Boulder Dam, the cost was some £19 per kW, but I believe half of this is debitable to irrigation; if so, the costs would come below the £12 mentioned above, with consequent practicability. It is, of course, practicable for Los Angeles, but that is only 300 miles away. These low charges, of course, can only be realised when we can select our water powers on the grand scale—not less than one to three million kW.

The only way in which line charges can be reduced to a practicable figure is to get this power over a single circuit (with one spare) and I believe this can now be done. It is all a question, now, of how far the transformer builders dare carry their voltages (the line-insulator question is solved). We can go to 3,000 miles, if they will rise to the occasion and if the initial power is cheap enough. The cost of the transmission line is down to some £1 10s. per kW for 2,400 miles (7s. 6d. per kW for 600 miles) which makes the cost of transmission negligible in relation to that of the water power. The capital cost per kW-mile is only about one-seventh that at Boulder Dam.

If electricity could be delivered in bulk in such places as Cape Town, Bombay, Alexandria, Buenos Aires and Rio de Janeiro at 0.10d. per kW (all told) large chemical works could be put down there, as at Niagara and at the (proposed) Assuan Dam. The chemical works would provide an 80 per cent. load factor, as in Tasmania. Transmission of over 1,000 miles, however, would not give the best result unless the power to be transmitted were over 500,000 kW.

Your correspondent may say that Victoria Falls (S. Africa) and Iguazu Falls (Brazil) are the only places left where the head is high enough to encourage hopes for cheap supply at the source. I have reason to believe, however, that these results can still, in certain cases, be obtained from rivers having no high head of fall—provided the rivers are large enough in volume. A. M. TAYLOR.

Birmingham, *November 17th.*

Planned Lighting

Mr. Howard Long's article in your issue of November 10th contains much of interest and much with which I agree. I feel, however, that his list of references is rather limited in scope and I wonder whether he is acquainted with the works of Professors H. H. Highbie and Parry Moon which, to my mind, are wider in outlook, more penetrating in analysis and altogether more interesting, varied and constructive than those in Mr. Long's list. Incidentally, a considerable number of references are incorrect.*

I quite agree with Mr. Long that the purpose of artificial lighting is to facilitate the functioning of the eye, that at this time true economy is required rather than ruthless curtailment of expenditure and as to the importance of diffusion and of avoiding glare of the various kinds mentioned. As he points out, with daylight, given adequate windows and/or roof lights, we have practically perfect diffusion or absence of shadow, and Mr. Long's article then develops into a discussion as to how we may best approximate to this condition in artificial lighting.

Unfortunately, he entirely neglects to discuss what would appear to be the simplest and indeed the obvious solution to this problem, namely, indirect lighting, which he dismisses with the unsupported statement that "generally it is not practicable." It is not at all clear what Mr. Long means by "not practicable." If he means that it is technically difficult to put in I would undertake to install really good indirect lighting in any typical factory he likes to specify and without undue difficulty or complexity of apparatus. If he means that it is financially prohibitive, again I invite him to specify a concrete case and I will undertake to show that indirect lighting would be much more economical both to install and to maintain than the system of direct lighting, subdivided into as many points as possible, which he appears to advocate.

If, as he states, "the requirement is to keep the lighting points as close together as possible," the nearer the "ideal" is approached the more fantastically extravagant will be the number of lamps and fittings required and the current consumption, and the more numerous the sources of glare; and if "the ultimate is to have all the fittings touching each other or to have indirect lighting" then the choice is easy, for surely the former can hardly be called an engineering proposition but is rather the extreme of impracticability, while the latter is the obvious method of approximately reproducing

[*Mr. Howard Long's bibliography was considerably abbreviated, and we regret that an error occurred in the re-numbering after the deletion of two items. The numbers in the table of references should be altered as follows:—(5) Should be (4); (6) should be (5); (7) should be (6); 9 should be (8); (10) should be (9); (11) should be (10); (13) should be (11); (14) should be (12); and (15) should be (13). There are no references to (4) and (12) in the text.—EDS., ELEC. REV.]

the evenness, diffusion and freedom from glare of daylight, especially as by intelligent design indirect lighting can often be installed with fewer points than are usual with ordinary direct lighting, thus economising greatly in wiring, lamps and energy. Finally, why does Mr. Long trouble to tell us that visual acuity increases up to 1,200 ft.-candles? Who cares about maximum visual acuity so long as we can see comfortably whatever we require to see? If an exceptional degree of acuity is required for some special purpose it is much simpler and more economical to use a magnifying glass than to waste time, trouble and money in boosting up the illumination to fantastic heights. I imagine Mr. Long has fallen into the same trap as so many others in failing to realise that the increased acuity obtained experimentally with very high foot-candles is only temporary, and that continued subjection to such high intensities of illumination can only lead to severe eyestrain and ultimate loss of vision. G. V. DOWNER.

London, W.C.2, *November 17th.*

Wireless Aerials

Some years ago I connected up a radio set to an outdoor aerial by a v.i.r. wire, about 15 ft. long, but found that reception was much affected by the position of the wire. Often the reception was bad, but it could be improved by moving the v.i.r. wire to another position, though it was not apparent why one position should be better than another. Later the v.i.r. wire was replaced by "Maconite" wire with great improvement. Possibly the v.i.r. wire was affected by the position of the earthing wire which ran to an earth plate out of doors, the set being at the back of a large room; but whatever was the cause of the trouble the "Maconite" wire overcame it. Doubtless any other "ite" wire would have been equally suitable.

Recently I have used this wire for a complete aerial from the receiving set to the outdoor post. At first it was not a great success, but I considered that this might be due to leakage from the copper conductor which was attached to the post by means of an insulator in the usual manner. There was trouble through chattering and noise, although it was better in very wet weather. I therefore sealed the conductor inside the insulation with Chatterton's compound and waterproof tape, and this has greatly reduced the noise and interference. It has also improved reception, particularly in brightening the sound of musical instruments.

Tynemouth, *November 14th*, 1939. C. TURNBULL.

[The vagaries of aerials are well known, but usually improvements or deterioration in reception are due to a combination of causes.—EDS., ELEC. REV.]

Ealing Electricity Charges

In view of your comments on the increases notified by electricity supply authorities you may like to comment on the fairness of the following arrangements by Ealing Corporation.

The running charge under Tariff "A" (all-in rate) has been raised from ½d. to ¾d. per kWh, the fixed charge being unchanged as yet. On my last year's consumption of 3,230 kWh, with a fixed charge of £4 12s. per annum, this means an increase to me of 29.6 per cent. in a year. The Tariff "C" (flat rate) has been raised from 4½d. to 5½d. per kWh, an increase of 22.2 per cent. The "prize bit," however, is that Tariff "B" (all-electric rate) is not increased, remaining at ½d. per kWh for the first 500 kWh per quarter and ¼d. per kWh after that amount is consumed. There are restrictions applying to Tariff "B" so that only certain consumers can take advantage of this rate, but why should "A" and "C" consumers pay such a large increase to carry the Tariff "B" consumers for the Corporation? BM/NSX3.

November 20th.

Parliamentary News

By Our Special Reporter

Sir Cyril Hurcomb's Position

ON November 15th, in the House of Commons, during the Committee stage of the Chartered and Other Bodies (Temporary Provisions) Bill, Mr. Chuter Ede moved to omit from the Schedule the Electricity Commissioners. He did this in order to raise the position of Sir Cyril Hurcomb, who, as chairman of the Electricity Commissioners, had now been appointed Director-General of Shipping. He had the highest opinion of Sir Cyril's ability and the last thing he wanted to do was to deprive the Commissioners of his services. But, with his departure, only two Commissioners were left, and, in the event of one of them being ill, or in any other way incapacitated, the Commissioners would be unable to act. It was not fair to the electricity supply users or to the industry that they should have to depend for decisions of major importance on a chairman whose main thought must at the moment be given to questions of shipping.

Sir P. Harris said that if the war dragged on the development of electricity would become increasingly important. It would be a disaster if the services of Sir Cyril Hurcomb were in any way curtailed in that important department.

Capt. Wallace, the Minister of Transport, said that the reason for the proposal was to deal with the situation created by the transfer of Sir Cyril Hurcomb to the Ministry of Shipping. He was a man of unique experience, and he (Capt. Wallace) was loth to contemplate his departure from the chairmanship of the Electricity Commissioners but it was patent that at present the interests of the Ministry of Shipping must come first. After consultation with Sir Cyril Hurcomb he had come to the conclusion that the interests of the electricity industry would be best served by retaining him in the titular chairmanship of the Commission. That was the sole motive for the proposal. The existence of a state of war had obliged the Commissioners to place on one side some major questions of policy, for example the reorganisation of electricity distribution and the question of holding companies in the industry. The day-to-day work of the Commission had been perceptibly reduced, and by common consent the other two Commissioners could effectively undertake matters of a technical character. On questions of major policy he was assured by Sir Cyril Hurcomb that, consistent with his whole-time duties at the Ministry of Shipping, he would find it possible to see that no question of major policy was submitted to him as Minister on which he (Sir Cyril Hurcomb) had not had time to pronounce. On that arrangement he (Capt. Wallace) would prefer to rely. On the previous day he had met representatives of three main bodies representing the electrical industry, who felt satisfied that the arrangement was satisfactory to the industry. If in the future he could be convinced that any other arrangement would be more to the advantage of the industry he would be willing to listen to any representations. The amendment was withdrawn.

Illuminated Shop Signs

Mr. Morrison asked the Home Secretary whether he was aware that shopkeepers were being asked to purchase illuminated signs of various types for indicating that their premises were open; and, in view of the uncertainty whether the use of such signs was permissible under the regulations, would he arrange for some authority, either central or local, to which these signs could be submitted for approval.

Sir J. Anderson said that he hoped shortly to announce the conditions under which such signs might be used.

Street-lighting Improvements

Sir H. Webbe asked the Home Secretary when he expected to be able to announce his decision as to the modification of street-lighting; and, if his experiments in that connection were not yet satisfactorily completed, would he, in view of the imminence of the Christmas shopping season, consider as an alternative, granting permission for shop-window lighting limited in amount and as to distance from the shop front, and so screened as to prevent light falling on the pavements.

Sir J. Anderson said that experiments with street lighting were being vigorously conducted under the direction of his Department, but he was not yet in a position to state whether a form of modified street lighting was practicable which fulfilled the two conditions, that it was of some value to pedestrians and to traffic but did not increase the danger of visibility from the air. As regarded shop window lighting, special experiments were being made and he hoped that it might be possible to make some concession on the lines suggested.

Supply Authorities' Coal Wagons

Sir G. Mitcheson asked the Minister of Transport whether his attention had been drawn to the difficulties of certain electricity undertakings through the requisitioning of their specially-designed coal wagons; and whether he would give instructions for their return to their normal use.

Captain Wallace said he had received representations that the coal wagons of certain electricity undertakers should be exempt from requisitioning. He was advised that these wagons were not "specially constructed" within the meaning of the Notice of Requisitioning, and to withdraw them from common user would tend to defeat the whole purpose of the pooling scheme.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE Page Prize for 1938-39 has been awarded by the Institution of Electrical Engineers to **Mr. O. H. Hosking** for his thesis entitled "Aerial Warfare and the Maintenance of Electricity Supplies."

Swansea Corporation Electricity Committee has recommended the appointment of **Mr. A. C. Thirtle,** A.M.I.C.E., A.M.I.E.E., assistant engineer in the Norwich Corporation Electricity Department, as deputy chief engineer at Swansea at a salary of £900, rising to a maximum of £1,100. It has also recommended the appointment of **Mr. J. F. Wright,** of Ilford, assistant section engineer to the Central Electricity Board in the London area, as technical assistant (distribution), at a salary of £506, rising to £529, and of **Mr. E. P. McCandlish,** sub-station charge engineer at Torquay, as control engineer.

Grimsby Corporation Electricity Committee agreed, at its meeting on November 14th, that **Mr. J. L. Bates** (distribution engineer) should be placed in charge of both distribution works and sub-stations, with an increase in salary to £559 per annum.

At the annual general meeting of the Junior Institution of Engineers (Inc.) on November 11th, **Dr. Herbert Chatley,** M.Inst.C.E., was elected chairman and **Messrs. N. L. Ablett,** B.Sc., and **J. W. Stenson,** were elected vice-chairmen.

Mr. J. T. Rymer has joined the board of Blackstone & Co., Ltd., and has taken up residence in Stamford. Mr. Rymer was recently elected to the board of R. A. Lister (Marine Sales), Ltd., which markets Blackstone marine engines.

Mr. H. V. Senior, of the Brush Electrical Engineering Co., is the new president of the Institution of Engineering Inspection.

Mr. R. Breerton, a director of Redfern's Rubber Works, Ltd., of Hyde, was installed Mayor of Hyde on November 9th.

Mr. H. C. Trenam, managing director of Standard Telephones & Cables (Australasia), Pty., Ltd., has returned to Sydney from a visit to the United States. Mr. Trenam was well known at the London office of Standard Telephones & Cables, Ltd., with whom he was associated before going to Australia.

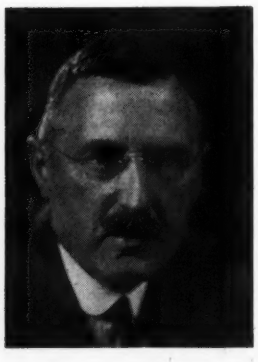
Prof. C. E. Martineau (vice-chairman) and **Mr. J. N. Atthill** have resigned from the board of W. & T. Avery, Ltd., for reasons of health. The **Earl of Dudley** and **Mr. D. W. Turner** have been elected directors and **Mr. W. H. Turner** has been appointed deputy chairman.

Sir Eugene Ramsden, M.P., has been appointed a director of the Anglo-Portuguese Telephone Co. to fill the vacancy on the board caused by the resignation of Lord Hinchingbrooke.

Mr. J. H. Thomas has resigned from the board of A. C. Cossor, Ltd.

Mr. J. Wilson, vice-president and general manager of the Shawinigan Water & Power Co., has been elected president in succession to the late Mr. J. C. Smith. Mr. Wilson joined the company in 1911 as chief accountant and became a director in 1914, serving also as secretary until 1933, when he assumed the additional duties of vice-president. He was appointed general manager in 1937.

Prof. S. Parker Smith, chairman of the Scottish Centre of the Institution of Electrical Engineers, whose address to that Centre is summarised in this issue, was born in 1884 and studied electrical engineering under Dr. W. M. Thornton in Newcastle-on-Tyne from 1901-5. He was awarded a research scholarship by the Royal Commission for the Exhibition of 1851, and spent two years under Prof. E. Arnold, Carlsruhe, Germany, to specialise in electrical machinery. On return to England in 1907 he was appointed assistant designer in the AC department of Siemens Brothers Dynamo Works, and in 1909 became chief designer with the G.E.C. at Witton, Birmingham. In 1912 he became lecturer and then assistant professor under Prof. T. Mather at the City and Guilds (Engineering College), South Kensington, where he remained for eleven years. His chief work in the last war was at Sheffield as consultant to Vickers, Ltd. In 1923 he was appointed to his present position as professor of electrical engineering at the Royal Technical College, Glasgow, and in 1924 he built an all-electric house; the results of this experiment were published in an I.E.E. paper and aroused wide interest. He is the author of five books on electrical engineering, and for many of his papers read before the I.E.E. he has been awarded premiums. He was a member of the I.E.E. Council from 1926 to 1929.



Elliott & Fry
Prof. S. Parker Smith

Mr. J. E. Macfarlane, B.Sc., A.M.I.E.E., whose appointment as head of the Electrical Engineering Department of Liverpool Technical College was briefly announced in our last issue, received his technical education at Brighton Technical College, and after serving with the R.N.V.R. in the last war joined the English Electric Co. as a student apprentice, becoming assistant designer at the company's Preston works in 1922. His next position was as chief assistant designer at Newtons' Dynamo Works, Taunton, which he took up in 1925, and he subsequently became chief designer to the reorganised concern Newtons of Taunton, Ltd. Mr. Macfarlane has had considerable teaching experience at the Harris Institute, Preston, and the L.C.C. Hackney Technical Institute, and before taking up his present position at Liverpool was senior lecturer in electrical engineering at the Northampton Polytechnic, London, where he was responsible for electrical machine design and working on the "heavy side" generally with advanced students.

Elliott & Fry
Mr. J. E. Macfarlane

Mr. W. Buckley, at present testing engineer with the Walsall Electricity Supply Department, has been appointed assistant distribution engineer with the Luton Corporation Electricity Department. Before going to Walsall Mr. Buckley was with the Blackburn Corporation electricity undertaking.

OBITUARY

Mr. H. F. Simon.—We regret to report the death of Mr. Horace Francis Simon, M.I.E.E., managing director of Electricity Services, Ltd., which occurred in a nursing home on November 18th after a long illness. He had been actively connected with the electrical industry for well over thirty years, and many of our readers will remember him for his activities in connection with "Typerlite" fittings. Until the last eighteen months, when his illness caused his semi-retirement, Mr. Simon always attended the more important trade conferences, &c., where his kindly disposition made him many friends. He was a member of the E.C.A. Mr. A. Tucker, who has been closely associated with Mr. Simon for thirty-three years, Mr. R. M. Simon, nephew of Mr. Simon, and Mr. F. J. Breeden, directors of the company, will continue to maintain the service for which the company is well known.

Mr. William Robson, a retired Post Office sectional engineer of Bishop Auckland, has died at the age of eighty-seven. Mr. Robson joined the telephone service in 1876, when he helped in experiments with a telephone line between North Shields and Newcastle in that year.

Mr. William George Lake, of Durrington, whose death recently occurred at Salisbury, at the age of sixty-three, was a pioneer of the Durrington Electric Light Co., Ltd. He was elected a director of the company at its inception in 1925, and held this office until his death.

Mr. J. T. Langridge.—The death occurred on November 15th of Mr. John Traverse Langridge, secretary of Albert E. Sudlow & Co., Ltd., electrical engineers and contractors of Manchester.

Mr. W. K. Vanderpoel.—The *Electrical World* reports the death of Mr. William K. Vanderpoel, an authority on transmission and power distribution problems, and vice-president of the Okonite Co. and the Okonite-Callender Cable Co. Mr. Vanderpoel joined the Public Service Corporation of New Jersey as divisional superintendent, later advancing to general superintendent of that company's entire electrical distribution system. His association with the Okonite Co. began in 1926, when he was elected vice-president and executive engineer. He was an active member and officer of leading electrical societies, and had served as a manager of the American Institute of Electrical Engineers.

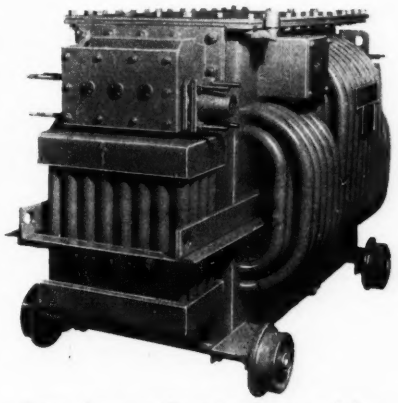
Will.—The late **Mr. Llewelyn B. Atkinson,** past-president of the I.E.E. and formerly director of the Cable Makers' Association left £23,602 (£22,484 net presonalty). His bequests included sums of £100 to the benevolent funds of the Institutions of Civil and Electrical Engineers and the E.I.B.A., and to the Royal Society of Arts.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Mining Transformers

UNDERGROUND mining type transformers are among new products of BONAR, LONG & CO., LTD., Princes Street Works, Dundee. The transformers conform strictly with the requirements of the Coal Mines Act and B.S.S. No. 355-1929. The cores are built up of high quality insulated "Stalloy" laminations and are of seven-step construction to minimise the no-load iron losses and excited current: a further advantage gained is the reduction effected in the magnitude of the harmonic currents. This results in the transformers being quieter in service and far less liable to impose heavy loads.



Bonar Long underground type mining transformer

The windings are braced against mechanical shock or the stresses imposed by a short-circuit or other fault conditions. The joints are phosphor-copper welded, riveted or soldered joints being eliminated. Full facilities are provided for earthing and also for carrying out insulation tests. The transformers are built to conform with the low height requirements of underground mining work and the tanks are of especially robust construction. To facilitate handling, slinging angles are fitted in addition to lifting hooks.

Installation Accessories

Several new electrical accessories are announced by M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, London, N.18. A complete new range of iron-clad switch-sockets, intended mainly for industrial use, is made for both horizontal and vertical mounting in three types—interlocking, anti-flash and non-interlocking. Heavy cast boxes and lids are used, the switch handles being well guarded by raised cast shields on the front cover. All the interior mechanism is fixed direct to the box and provided with top screw terminals for easy wiring. Ample space is provided to enable the use of bushes and locknuts for conduit termination. Rubber-clad and fused plugs can be supplied as alternatives to finger shield plugs.

M.K. "No. 980" clock connector

For situations where projection must be kept to the minimum there is a new range of 5-A iron-clad surface-mounting switches available in units up to 20 ways. Quick-make-and-break actions are fitted and unthreaded bridges ensure that no ugly threads project through the cast lids. The boxes have smooth sides and rounded corners with all conduit pads on the inner sides. These switches are also made in a slightly deeper design so as to enable the dollies to be sunk in the recessed cover.

M.K. watertight standard switch

Standard switches are also now made in a watertight pattern with a rubber gasket fitted between the cast-iron lid and box: in this case operation is by means of a milled wheel at the side.

A neat and efficient clock connector, "No. 980," is made to fit small B.S.S. conduit boxes. A single-pole cartridge fuse is incorporated.

Mercury-switch Relays

LONDEX, LTD., Anerley Works, 207, Anerley Road, London, S.E.20, is now supplying its type "LQA" mercury-switch relay for up to 50 A triple pole. The coils are continuously rated, suitable for up to 600 V AC or DC, or in the case of current coils for up to 50 A DC. The coil consumption is extremely low, being only 2 VA on AC and 1 W on DC. For AC excitation the relay is fitted with shaded poles with highly polished surface to secure silent working.

Londex mercury-switch relay

Due to the efficient design, ample power is available to operate the several heavy-duty mercury switches. The simple tilting principle enables the "on" and "off" positions to be clearly seen. The relays can be fitted with mercury switches to "make," "break" or change over as required, and special forms are available for push-button control and delayed operation. Above 6-A switching capacity the switches have a strong porcelain liner fused into the glass tube between the electrodes.

Medical Lamp

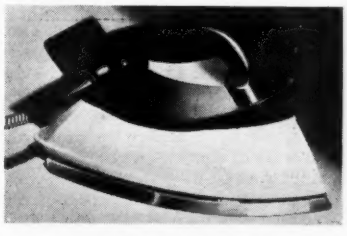
An efficient solution of the problem of producing the full range of therapeutic rays by means of a reasonably priced and practical lamp is the claim for the new "Perihel Mixray," a British-made unit produced by Perihel Sun Lamps and distributed solely by ATLAS EXPORTERS & IMPORTERS, LTD., 24-26, Holborn, London, E.C.1.

"Perihel Mixray" lamp

The lamp incorporates two reflectors, one fitted with a mercury vapour lamp of special construction, and the other holding a non-glowing infra-red element. Thus both ultra-violet and infra-red irradiation can be produced and used simultaneously or alternately, while the flexible joints of the stand allow the reflectors to be moved to any position desired. Both floor and table models are available.

Controlled-heat Iron

A controlled-heat iron intended to meet the demand for competitive price apparatus has been brought out by H.M.V. HOUSEHOLD APPLIANCES, Bourne Bridge, Hayes, Middlesex. The modern design provides a moulded bakelite handle which not only comfortably fits any hand, but is so shaped as to form a guard protecting the user from touching the hot top of the iron. Concave edges of the chromium-plated sole-plate permit easy manipulation around buttons.



H.M.V. No. 2 controlled-heat iron

Ironing temperature is controlled by means of a dial, calibrated with the names of the various materials, fixed to the back of the iron. The element is loaded at 800 W. The iron weighs 6 lb. and has a primrose vitreous enamelled shoe.

Alarm Switch

The "PB1N" alarm switch made by ALLEN WEST & Co., LTD., Lewes Road, Brighton, has been designed for all applications requiring a quick-acting device for breaking motor control circuits, completing alarm circuits, or starting up auxiliary equipment under emergency conditions. It is particularly suitable for sprinkler fire-pump control.

"PBIN" alarm switch

A light glass panel retains in position the operating button, which is automatically released when the glass is broken. The operator is not required to depress the button by hand after the glass has been broken and thus the danger from jagged glass is avoided. The switch contacts can be arranged normally closed or normally open, or two sets can be fitted to obtain change-over operation. In the latter case, when the glass is broken a motor control circuit can be interrupted and, at the same time, an audible signal made to function.

Actually, the switch is an adaptation of a complete new range of push-button switches brought out by the company for control circuits up to 650 V. These are available in single- two- and three-way models all with breaking capacities of 5 A, AC, inching and locking features being incorporated if desired. The cases are of cast-iron for the standard enclosure, and of semi-steel for watertight models, with shrouded brass finger presses and external fixing lugs. Switch interiors are moulded bakelite with large contacts and the minimum of springs and moving parts. All contacts are self-cleaning and are silver-plated to ensure long life. The switch interior is designed to permit easy access to the cable terminals.

Current Transformer Testing Set

The Petch-Elliott current transformer testing set brought out by ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13, provides a highly sensitive method of testing precision current transformers at a given frequency, by comparison with a reference standard transformer. The standard set is capable of testing current transformers with 5-A, 1-A, or 0.5-A secondaries, selection being accomplished by means of a single switch. The apparatus indicates directly in percentage (for ratio) and minutes (for phase angle) and is unaffected by stray fields.

Petch-Elliott current transformer testing set

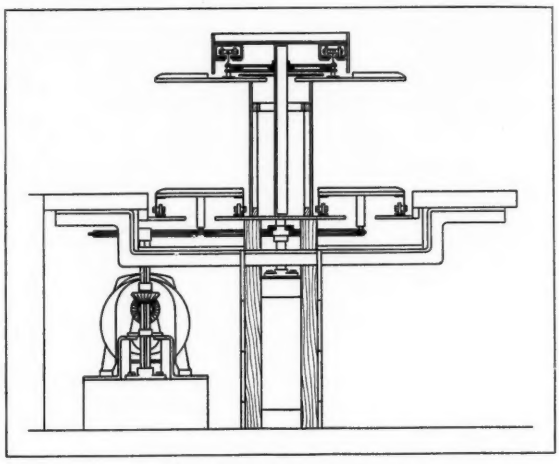
Neither auxiliary supplies nor phase-shifting transformer is necessary, and as no precision readings have to be taken excellent results can be obtained in the hands of a semi-skilled operator. The burden imposed by the set on the transformer under test is negligibly small, and on the standard is 1.5 VA. The apparatus is portable, compact and robust, and can be set up in a few minutes.

The testing set itself is self-contained in a hardwood case and the vibration galvanometer which, for convenience, is made as a separate item, has a self-contained spot light mirror and screen. A knife-type multi-contact switch selects the rating of the transformer on test and there are an instrument to indicate load current, ratio and phase error rheostats, keys to reverse the sense of either of the latter to deal with positive or negative errors, and a sensitivity control for the galvanometer. A key also provides a direct or low range, a high range (giving a multiplying constant of 5 to both error scales), and a polarity check position.

The normal model on its low (direct) range has error scales as follows:—Ratio: ±0.5 per cent.; phase angle: ±20 minutes. The high range multiplies the error figures by 5 (*i.e.* ratio ± 2.5 per cent., phase angle ± 100 minutes), while on the low range, at 1/5th rated secondary current, it is possible to detect differences of 0.002 per cent. and 0.1 minute. At 1/20th rated secondary current, these figures are 0.005 per cent. ratio and 0.25 minute.

Small-part Conveyor

For the assembly of light components of electrical apparatus the SHAW MECHANICAL EQUIPMENT CO., Julian Way, Harrow-on-Hill, Middlesex, has introduced an endless duplex conveyor. In its usual form the conveyor comprises an upper or feeder section consisting of a power driven endless chain on each twin bench 12 in. above the working level. On this are placed trays containing the components; these trays can be in different colours or they can be arranged automatically to deposit the appropriate parts opposite any operator.



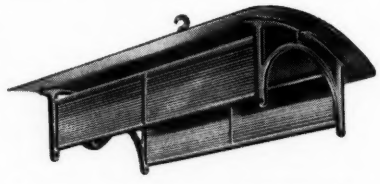
Section across Shaw conveyor

At bench level is the distribution section of the conveyor taking the components from one bench to the next for subsequent operations and so on past inspection benches to the stores. Apart from the attendant who initially keeps the trays supplied with parts and the actual work of assembly, no handling is needed throughout the proceedings. Speed is adjustable in any direction and no carrying surface or energy is wasted in running under benches.

Industrial Lighting Fittings

The "Duo-beam" fitting made by the ENGINEERING & LIGHTING EQUIPMENT CO., LTD., Sphere Works, St. Albans, embodies a system of distribution new to industrial lighting and incorporating horizontal distribution which has already proved its efficiency in street lighting.

To obtain the desired results from the long light sources such as sodium or mercury electric-discharge lamps when operated horizontally, special refractor plates have been designed for the company by Holophane, Ltd., which are a combination of two sets of prisms. The lower set gives the main distribution at 38 deg. below the horizontal, above which there is a sharp cut-off, thus obviating glare. The top set of prisms reflect the light on to an overhead vitreous enamelled reflector, and thence on to the working plane where it is required. In practice, it is found possible to obtain remarkably even distribution, and high intensity spots underneath the fitting are entirely avoided.



"Duo-beam" industrial lighting fitting

To deal with the complete range of mercury and sodium lamps only two fittings are necessary, one to deal with 85- and 140-W sodium lamps, and the other for 45- and 60-W sodium lamps, and 250- and 400-W mercury lamps. The construction is very substantial and cleaning is easily carried out as the refractors have smooth interior and exterior surfaces, while the overhead reflector is vitreous enamelled and free from obstruction.

TWO-PART TARIFF CHALLENGED

Wimbledon Consumer's Test Case

IN the Chancery Division on November 16th Mr. Justice Simonds had before him an action brought by the Attorney-General at the relation of Major C. H. Stevens, Worple Road, Wimbledon, and by Major Stevens as second plaintiff against the Wimbledon Corporation claiming that the Corporation's two-part tariff for electricity supplied to the Major's house was invalid and *ultra vires*. The plaintiffs also claimed a declaration that the Corporation was not entitled to supply electricity on the terms of its two-part tariff and also an injunction to restrain it from so doing, and a further declaration that all consumers in the Corporation's area were entitled to be supplied under a two-part tariff imposing uniform terms.

The plaintiffs further claimed a declaration that Major Stevens in respect of his house was entitled to have the annual fixed charge under the two-part tariff without the restriction of a limit to the maximum demand of 2½ kW during "peak" hours and, secondly, a declaration that he was entitled to be informed by the defendants of the basis and method of the annual fixed charge assessed on his house, and further an injunction to restrain the defendants from imposing a maximum demand limit together with repayment of all overcharges and all necessary accounts and inquiries.

Major Stevens alleged that in October, 1936, he discovered that he had been overcharged for the size and type of house he occupied and that he protested against the fixed charge of £15. The defendants declined to reduce the charge except on the condition that the Major submitted to a maximum demand of 2½ kW during the peak hours in the early morning and evening in the months of November and December. Major Stevens alleged that no such maximum or other limit was imposed by the defendants on other houses of a similar type and size to his own and that similar houses were assessed at about £7 a year and that on asking the defendants for information as to the basis and method on which the annual fixed charge was assessed on him the defendants declined to give any information.

The defendants in their defence said that the Major in October, 1936, had inquired of them what maximum demand he might make and yet obtain a two-part tariff and was told that if his maximum demand was reduced to 2½ kW at the times of peak load his fixed charge would be reduced to £7 0s. 6d. and that he accepted those terms but later withdrew from them.

Floor-area Basis Attacked

Mr. Harman, K.C., for the plaintiffs, said that in 1933 the defendant Corporation started to supply electricity under the two-part tariff. He said that the main question in the case was whether or no the two-part tariff was *ultra vires* the Corporation. That was a matter in which the Attorney-General was interested on behalf of the public.

The matter concerned only domestic consumers, and his Lordship had to consider whether each had a special case to be dealt with or whether they were entitled to a corresponding supply in similar circumstances. Major Stevens was a large user of power. As a condition of reducing the Major's fixed charge to that obtaining in other houses the Corporation proposed that his demand should be restricted at peak loads, which showed that in singling out Major Stevens the defendants were going beyond anything they were justified in doing.

Continuing his address on November 17th, Mr. Harman said that the floor area of the Major's house was 3,436 sq. ft., and on that basis his fixed charge from April 1st, 1935, worked out at £7 0s. 6d. Counsel contended that if a two-part tariff could be justified one based on floor space was bad, as it was bound to produce cases of undue preference.

When the hearing was resumed on Monday last Mr. Harman maintained that the floor-area basis of assessment was unfair. It was also unfair to discriminate between consumers who used electricity for lighting and those who had electric heaters and cookers. If two people came within the scope of Section 19 of the Electric Lighting Act, 1882, any distinction between them was an undue preference. Moreover, an agreement which the Corporation was able to revise while the consumer had to give twelve months' notice to terminate it was no agreement at all. The restriction placed on Major Stevens was not made in the case of any other consumer in the borough.

Giving evidence, Major Stevens said that he occupied two adjacent houses; he lived in one while the other was used for business purposes and the two-part tariff did not apply to it. He entered into a two-part tariff agreement in November, 1933, and in March, 1934, the fixed charge was altered without notice. He said that he occasionally consulted people at his house in connection with business but the business was carried on solely in the other house.

He agreed that the two-part tariff had resulted in a considerable saving to him. The cable to the dwelling house had proved inadequate and was replaced; he had always notified the Corporation of any added apparatus.

Sir Lynden Macassey, for the defendants, said that undertakers were not obliged to observe exact equality of treatment; they must be allowed ordinary commercial latitude. The Corporation was bound to take action if it found that a consumer was paying less than the cost of supplying him. Under the two-part tariff consumers were saving about 25 per cent. If they saved more they would be getting electricity for less than its cost.

Electrical Engineer's Evidence

Mr. A. E. Mackenzie, the Corporation's electrical engineer and manager, called as a witness, said that only three undertakings in the country had lower unit charges than Wimbledon, viz., Glasgow, St. Marylebone and Guildford. The Corporation's load was almost entirely domestic. He estimated that two-thirds of the consumers would gain by the two-part tariff. Too large a saving indicated an abnormal demand, but it had been necessary to make only 70 special assessments among the 13,000 consumers on the two-part tariff.

On November 21st Mr. Mackenzie continued his evidence. He said there was no question that the consumption recorded for a large house in the area of supply was vastly different from that in a smaller house. In ninety-nine cases out of a hundred the floor space method ordinarily worked fairly. The fact that there was a variation in the average price per unit paid by various consumers did not indicate any inequality or unfairness. A consumer who used energy for lighting only would pay a higher price than a consumer who used energy for lighting and power. The object of the two-part tariff was to improve load factor by encouraging greater use. It also enabled the Corporation to buy its bulk supply more cheaply from the Central Electricity Board, and the benefit was passed on to the consumers.

The probable load factor was considered when any special assessment was made, but it was impossible to apply any formula. He framed his assessments on the experience of between 30 and 40 years in his profession.

The case was still proceeding as we went to press.

Gloves with Conductive Linings

AN intriguing suggestion for the avoidance of accidents due to the breakdown of rubber gloves or boots has been put forward by a French engineer, Mr. Kervan, who has for many years studied safety methods in the electrical industry. His suggestion is that if the interior of rubber gloves and boots is rendered conductive, and the two gloves or boots, or even the gloves and boots, are connected together by conductors, any piercing of the rubber will not affect the worker. What would occur would be a short-circuit, through the conductive lining of the gloves or boots and their connecting conductors, and the worst that could happen to the worker in the most unfavourable case would be a burn due to the heating of the connecting conductor.

Although metalisation of the interior surface of the glove would be the ideal solution, this would raise difficulties. A more practical scheme, he suggests, would be to use conductive latex for the first dipping in the manufacture of a glove or boot, and insulating latex for the other dippings. Conductive latex is now used for the manufacture of rubber belts for certain special purposes. It has a resistance of 1 ohm per square centimetre, which is considerably less than the resistance of the skin, even when wet, so that any current reaching it through the breaking down of rubber would flow through the conductive latex in preference to the skin.

Each glove would be provided with a carefully insulated contact of the snap fastener type, on to which the terminal of an insulated flexible copper conductor cable could be snapped. When the worker wore only gloves, a single conductor could connect them; if both gloves and boots were worn, all four would be connected by cables fastened together. The cables could be placed under the overalls or work jacket, so as not to get in the way while the man is working.

COMMERCIAL and INDUSTRIAL NEWS

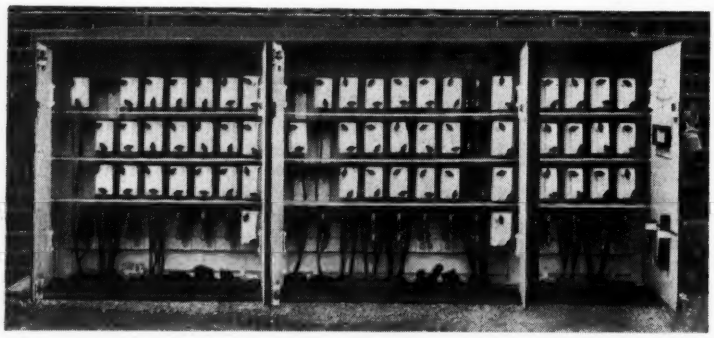
Contractors' Difficulties at Southport. A Large-capacity Feeder Pillar. Lighting in a Printing Works. London Technical Institutes Re-opening

Overseas Trade in October

LAST month British exports of electrical goods and apparatus lost further ground, amounting in value to £510,038 compared with September's total of £566,518 and £1,155,388 in October, 1938. Exports of all types of machinery, at £2,057,805, were also less than in September (£2,259,796) and compare with £4,838,978 a year ago. On the other hand, imports of electrical goods and apparatus recovered from £124,888 in September to £202,346 last month (£300,191 in October, 1938), while machinery imports rose from £1,418,660 to £2,120,760, which substantially exceeded the total value in October last year (£1,777,995).

Southport Contractors' Complaint

Southport Chamber of Trade has decided to send a letter to the Town Clerk pointing out that Government restrictions prevent the Electricity Department from laying service cables from the streets to houses, although it has the cables and men available.



Callender 21-way feeder pillar at Kent County Mental Hospital, Farnborough

The Chamber's action follows the receipt of a letter from the local Electrical Contractors' Association in which it was stated that members were engaged in the business of installing electrical equipment in buildings which required the Corporation Electricity Department to lay service cables, &c., from the street into the premises to be supplied. The borough electrical engineer had informed them that the Electricity Commissioners were restricting his powers to lay services, and applications had been made to them for permission to do so, but to date no sanctions had been received.

It was added that many members had properties already wired, and were unable to complete their work and present their accounts by reason of these restrictions. They were unable to obtain new work due to the inability to promise a supply of electricity. The result of this was complete stagnation. The Government had requested employers of labour not to throw employees on the Labour Exchange unless absolutely forced to do so, but they were prevented from obtaining the work necessary to avoid it. It seemed ridiculous that jobs could not be completed when, it was understood, there was plenty of cable in the town which could be used to put the proper services into operation.

Christmas Decorations

Christmas shopping this year will lack the cheery atmosphere of pre-war years which the stores provide by way of exterior festive illuminations. There is no reason, however, why decorative lighting "blacked-in" should not be as popular as ever, and many households will no doubt strive to forget the gloomy exterior and try to recapture the Christmas atmosphere by transforming the interior of the house with the aid of Christmas decorations. In this connection the British Thomson-Houston Co., Ltd., has issued a leaflet as a reminder that once again "Mazda" decoration lights are available. There are three outfits, "fairy" lights (series-burning and parallel-burning), "Snow White" lights and "Mickey Mouse" lights, all of which should prove popular additions to decorative schemes.

Birmingham Electric Club

A Christmas luncheon will be held by the Birmingham Electric Club on December 15th at the Grand Hotel, Birmingham, when Mr. J. Hamilton will preside. Tickets (5s. each) can be obtained from Mr. A. T. Haywood, hon. social secretary, 24, Tamworth Road, Sutton Coldfield.

Romance of Industrial Engineering

In 1852 the Kennedy Meter Syndicate was formed, and out of this has grown Glenfield & Kennedy, Ltd., which from modest beginnings has become the largest concern in the Empire devoted exclusively to the control and measurement of water. The history of the company, which has been written by Mr. J. Morris (the chairman) under the title of "A Romance of Industrial Engineering," while naturally being chiefly concerned with the inception, functioning and fortunes of the company, nevertheless is an interesting review of the conditions and problems of industry in the middle of the nineteenth century, as well as containing much interesting information on the history of Kilmarnock where the company's works are situated. The book is published by the company and is priced at 15s. 6d.

A 21-way Feeder Pillar

Few feeder pillars have, we believe, been installed with a capacity approaching that of the one recently made by Callender's for the Kent County Mental Hospital, Farnborough. The pillar is of mild steel and measures 8 ft. long by 3 ft. 6 in. high (above ground with 1 ft. 3 in. below ground) by 12 in. deep. It contains Callender's 2-in. break fuse gear with h.r.c. fuses operated by shrouded porcelain handles with insulated thumb-screws. The pillar, which has five doors (two pairs and a single) controls twenty-one four-core and twin cables ranging from 0.2 to 0.022 sq. in. One section of the bus-bars can be isolated from another by means of plug-in links.

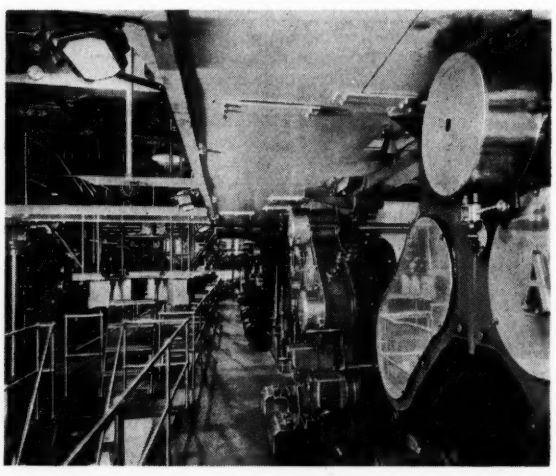
Scrap Iron and Steel Control

A new Order (Control of Iron and Steel (No. 5) (Scrap) Order, 1939) for the control of scrap iron and steel supersedes the (No. 3) Order. This fixes, as before, maximum prices for the various grades of scrap, delivered at consumer's works. Prices have been increased or reduced in certain cases to bring values for delivery in the various districts into correct relationship under existing conditions, but there has been no general change.

Printing Works Lighting

The lighting of newspaper printing presses is always a matter of difficulty, owing to the design of these large machines. Normal industrial lighting will not penetrate to all places where illumination is of great importance, such as the printing cylinders. The Newcastle Chronicle, Ltd., decided to adopt the scheme submitted by the British Thomson-Houston Co., Ltd., for the lighting of its newly installed presses, and the co-operation between the two companies' engineers has enabled a very fine installation to be completed. The general lighting is by means of "Mazdalux" dispersive reflectors of various sizes from 60 to 300 W.

The most interesting parts of the installation are the lighting of the ink controllers and of the interiors of the presses. The former is carried out by fittings with flat prismatic plates, designed to give the highest illumination on the controllers. The fittings are so situated that the operator does not cast a shadow on these important controls. For lighting the interior of the presses a special "Mazdalux" fitting was developed that could be housed in the cut-away web of the transverse



Lighting of inking controls at the works of the Newcastle Chronicle, Ltd.

girders. This fitting, which employs a 100-W "Mazda" lamp, is double-sided with opal glass panels. A notable feature of the installation is the complete absence of glare, while there is ample illumination for every operation to be speedily and efficiently carried out. The Newcastle Chronicle, Ltd., has placed further orders for the lighting of additional presses.

Modern Lighting Installation

An excellent example of modern lighting practice applied to decorations of historical interest is furnished by an installation recently carried out in the Painted Hall of the Royal Naval College, Greenwich. The Painted Hall was designed by Sir Christopher Wren and its ceilings and walls bear a series of large emblematic paintings executed by Sir James Thornhill from 1708 to 1727. It has been used as a picture gallery and as a repository for the principal Nelson relics, but is now the officers' mess of the Royal Naval College. The Hall has been restored practically as Wren designed it and Thornhill decorated it.

The special lighting installation, which was carried out by H.M. Office of Works in conjunction with the General Electric Co., Ltd., consists of concealed lighting fittings. These illuminate the painted ceiling indirectly by means of specially designed louvred floodlights, each equipped with 250-W horizon lamps and mounted on the high window sills. The mural decorations at each end of the Hall are illuminated in a similar way. As the ceiling has a specular surface any ordinary indirect lighting would have produced reflections of the lighting fittings, thus spoiling the effect of the paintings. The G.E.C. also supplied a number of electric food trolleys of special design and made throughout of stainless steel for use at the College.

Calendars

Some weeks ago we drew our readers' attention to the three calendars for 1940 which E.D.A. has prepared. Despite the difficult times, it is still of the greatest importance that electricity undertakings should keep in touch with consumers, and the new calendars, distributed to such establishments as doctors' waiting-rooms, shops, cafés, and hairdressers', will prove an effective and economic way of advertising. The three designs chosen by E.D.A. comprise a seascape, a Dutch interior, and a windmill, space being provided for overprinting.

Mr. Christopher Wade, of Gabriel Wade & English, Ltd., has chosen a charming picture of a lady with her pet Sealyham terrier for his calendar for 1940.

Winding-up Petition

In the Companies Court on November 20th Mr. Justice Bennett had again before him the petition for the compulsory winding up of Architectural Constructional & Electrical Utilities, Ltd. Counsel now asked for a further adjournment. His Lordship said that this company had been ordered to be wound up once, and that order was stopped. Counsel said there were complications. The company was doing the best it could in the matter. By agreement the petition was held over till the last petition day of the present sittings.

Change of Address

Electrolux, Ltd., has removed its offices from 153-155, Regent Street, London, W.1, to Electrolux Works, Luton, Beds.

Purchasing Officers' Association

The Purchasing Officers' Association has established wartime headquarters at 5, Pierrepont Street, Bath. The secretary, however, has retained a private office in Westminster. While many of the customary evening lectures will for the time being be suspended, the Association will arrange regular luncheon meetings for its members in the branches. But for the war, the Association's training and examinations scheme would have been launched this autumn and the courses for the intermediate examination would have been available to students in some thirty technical and commercial colleges. Many of the latter were closed on the outbreak of war though some are now reopening. The courses are now available at a number of colleges. The president and chairman of the Association for the current session are Mr. L. Dunkerley (of Rowntree & Co., Ltd.) and Major W. Lewthwaite (of the General Electric Co., Ltd.), respectively.

A Large Transporter

A large mobile transporter weighing 82 tons and measuring 100 ft. long over the boom has been built by Mavor & Coulson, Ltd., for Cafferata & Co., Ltd., of Newark. It receives gypsum and clay from a drag-line excavator, separates the gypsum, and carries the clay across the open cut to the spoil-heap. The object is to win a maximum amount of the gypsum, and to dispose of the waste material, *i.e.*, clays, on to the spoil heap, a distance of 100 ft. away from the feeding point. The success the transporter has achieved owes much to the M. & C. grit-proof idler rollers on which the belts run. It is mounted on four double-flanged four-wheeled bogies, and has its own track-laying arrangement, thus making it unnecessary to lay a track the full length of the quarry face.

On the lower deck of the structure is arranged the machinery for hoisting and slewing the boom and for moving the transporter. These three movements are operated by a single electric motor through a worm reduction gear and spur reduction. The power for slewing the boom is taken through a set of bevel wheels to a vertical shaft. On the top of the shaft is fitted a pinion wheel arranged to mesh with a semi-circular rack bolted to the boom slewing frame. The boom slews through an angle of 88 degrees. The 3,000-V supply is transformed to 440 V by a 100-kVA transformer on the bottom deck of the transporter; the transformer feeds the main drag-line excavator as well as the motors on the transporter. On the upper deck of the transporter is the mechanical handling equipment, each unit of which has an independent electric drive through suitable worm reduction gear. The whole of the equipment is electrically interlocked, ensuring that the various units are started and stopped in the correct sequence. In addition the raising, lowering, and slewing motions have limit switches which operate at the predetermined limits.

Taken over a period of say one week's work, the average rate of feed of excavated material to the transporter is 40 tons per hour, out of which about 5 tons per hour of gypsum lumps is got and 35 tons of waste material conveyed to the spoil-heap, but owing to variations in the speed of excavation at times these figures are at least doubled. The average power consumption is less than 0.5 kWh per ton of excavated material fed to the machine, including the power used in travelling. In spite of the very adverse working conditions, costs taken over a period of one year were only 0.08d. per ton fed on to the machine.

Argentine Import Restrictions

With reference to the recently revised import restrictions in Argentina, a further report from H.M. Ambassador at Buenos Aires states that applications for the import of the following articles into Argentina from any country are subject to special examination by the exchange authorities; applicants must furnish a description of the goods and state the purpose for which they are required:—Electric dynamos and motors; other dynamos and motors; machines and motors in general (other than agricultural) and component parts thereof, except parts considered as for consumption.

Trade Announcements

Mr. J. S. Smith informs us that he has disposed of his interest in the Sounder Telephone & Electric Co., of 70, Victoria Street, London, S.W.1.

The name of Reeves & Co., has now been changed to Reeves & Co. (Birmingham), Ltd.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price November 22nd	Fortnight's inc. or dec.
a Acid oxalic ... ... per cwt.		—
a Ammoniac, Sal ... ... per ton		—
a Ammonia, Muriate (large crystal)... ,,		—
a Borax... ... ... ,,		—
a Copper, Sulphate ... ... ,,		—
a Potash Chlorate ... ... per lb.		—
a ,, Perchlorate ... ... ,,	Suspended	—
a Shellac ... ... per cwt.		—
a Sulphur, Commercial ... ... per ton		—
a ,, Roll ... ... ,,		—
a Soda, Chlorate ... ... per lb.		—
a ,, Crystals ... ... per ton		—
a Sodium, Bichromate, casks ... per lb.		—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/3 to 1/9	—
b ,, Sheet and Foil ... ,,	1/4 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£197	—
Grade II ... ... ,,	£137	—
Grade III ... ... ,,	£73	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8¾d.	—
c ,, Tubes (solid drawn) ... ... ,,	1/0¼ to 1/0¾	—
c ,, Wire, basis ... ... ,,	9¼d.	—
c Copper Tubes (solid drawn) ... ,,	1/1¼d.	—
g ,, Bars (best selected) ... per ton	£85	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£51	—
d ,, ,, Wire Rods ... ,,	£55	—
d ,, ,, H.C. Wire ... per lb.	8¾d.	—
f Ebonite Rod ¼" dia. & up ... ... ,,	1/10 to 2/3 +10% adv.	—
f ,, Sheet ⅛" thick & up ... ,,	1/4 to 1/8 adv.	—
n German Silver Wire, Nos. 1 to 12... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Para-fine ... ... ,,	11¼d.	—
g Lead, English Pig ... ... ,,	Nom.	—
g Mercury ... ... per bot.	Nom.	—
e Mica (in original cases) small ... per lb.	1/3 to 3/–	—
e ,, ,, ,, medium ... ,,	9/– to 18/–	—
e ,, ,, ,, large ... ,,	20/– to 27/6	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/2	—
p ,, ,, rolled strip & sheet ,,	1/–	—
p ,, ,, wire ... ... ,,	1/2	—
o Platinum ... ... per oz.	£10	—
d Silicium Bronze Wire ... ... per lb.	8¾d.	—
g Spelter ... ... per ton	£15	—
g Tin, Block (English) ... ... ,,	£230	—
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/3	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

Fatality

At the inquest on Lance Corporal Stanley Pentith (27), of Hull, a verdict of "Death by misadventure" was returned. It appeared that Pentith met his death through touching an overhead electric wire in the Murdoch Club, Preston. The electrical system at the club was examined after the accident by Mr. W. Martland, a Preston Corporation installation inspector, who told the Acting Coroner (Mr. A. L. Ashton) that there was a fracture in a part of the electrical tubing at the scene of the accident, and he expressed the opinion that a coupling had become undone through pressure being applied to it. Detective-Sergeant Clarkson stated that Pentith had both hands on the tubing and both feet on the floor. He might have received a shock in one hand, and placed the other hand on the tubing to free himself.

London Technical Classes

Many of the London polytechnics, technical institutes and art schools are resuming their programmes of work. The necessity for air-raid protection and the difficulties of the "black-out" will entail certain modifications, and the extent to which the classes will be held will depend largely upon demand. Enrolments so far have been good. Particulars of fees and times of classes can be obtained on application to the institutes.

Germicidal Lamps

New lamps specially designed to emit ultra-violet rays for sterilising are announced by the lamp department (Nela Park, Cleveland) of the General Electric Co. of America. They are available in 3, 5 and 15 W sizes, their tubular bulbs being made of special non-absorbing glass; the smallest is just over 5 in. long and 0.5 in. in diameter. They operate in conjunction with a choke, the 5 W size fitting into an ordinary lampholder, but the 3 and 15 W sizes require special sockets. Their output is said to be rich in the shorter-wave radiations, particularly in the 2537 A region, so differing greatly from the longer 2800-3200 A band of so-called sunlamps. Their germ-killing effectiveness is reduced by falling atmospheric humidity and temperature, under which conditions twice or three times longer exposures are necessary. This is due to diminished output of radiation, less than 60 per cent. of normal at freezing point and when the relative humidity is low.

Institution of Engineering Inspection

The Institution of Engineering Inspection announces that its registered office is now at 5, Pierrepont Street, Bath. The secretary of the Institution retains a personal office in London where he interviews members by appointment and where Council meetings are still being held. A special classification for inspecting engineers has been established in the Central Register for National Service and the Institution is co-operating with the Ministry of Labour in securing the registration of those of its members who are not already in Government employ or otherwise engaged on work of national importance. The Institution has six branches arranging programmes, apart from the programmes held in London. It has been decided to suspend evening lectures for the time being, but luncheon meetings will be organised wherever possible. Technical papers, which otherwise would have been presented at evening meetings, will be circulated to members and then discussed at the luncheons as well as in the quarterly journal.

"Concerning Callender's"

No. 12 of the series "Concerning Callender's," which has just been issued by Callender's Cable & Construction Co., Ltd., illustrates a variety of works, buildings, &c., in which extensive use has been made of the company's cables.

Catalogues and Lists

Drayton Regulator & Instrument Co., Ltd., West Drayton, Middlesex.—An illustrated folder giving brief particulars of automatic electric switches and valves.

Siemens Brothers & Co., Ltd., Woolwich, London, S.E.18.—Joint box compounds catalogue No. 170.2, being a comprehensive list containing information on the electrical, chemical and physical characteristics of the compounds supplied by the company.

Marconi-Ekco Instruments, Ltd., Electra House, Victoria Embankment, London, W.C.2.—Index sheets giving brief specifications of precision measuring and testing equipment for the communication industries.

Rotherham & Sons, Ltd., Coventry.—A folder drawing attention to the company's facilities for manufacturing precision instruments and components to its own or customers' specifications.

Johnson & Phillips, Ltd., Charlton, London, S.E.7.—Publication No. S.G.16 describing spring closing operating mechanism for oil-immersed circuit-breakers.

British Insulated Cables, Ltd., Prescot, Lancs.—Leaflet No. P.F.352 relating to a new 5-A 3-pin plug and socket for use in the B.I. industrial wiring system. Also leaflet P.F. 353 giving particulars of B.I. fire resisting insulated cables.

Watson & Sons (Electro-medical), Ltd., Sunic House, 43-47, Parker Street, Kingsway, London, W.C.2.—A brochure dealing with the "Autonome II" motor-driven radiographic couch.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

BRISTOL hand lamp.
CURVELITE products (agent).
G.E.D. bench light fittings.

Electrical Fair Trading

Council's Report for 1938-39

ONE of the principal activities of the Electrical Fair Trading Council during the year ended September 30th last was the preparation of lists of "discount snatchers"—firms, organisations and individuals who are known to make a regular practice of soliciting discounts on electrical goods although they are not entitled to them under the terms of the Fair Trading Policy.

To assist the dissemination of the Policy, particularly among the selling staffs of electrical manufacturers and distributors, it was recently decided to reproduce the document in pocket-size form. A large number or free copies have since been circulated to hundreds of firms throughout the country, many of whom have purchased additional copies for their employees.

The Policy continues to receive strong support from the industry and is now firmly established as the approved trading code for electrical products.

A register has been set up for approved decorators (or decoration specialists) as defined in Schedules 2, 3 and 4 of the Policy. Other registers are in course of preparation with respect to approved wholesalers in the various sections of the trade within the Policy's scope. One such register is already being operated very effectively by members of the Electric Light Fittings Association.

The Council, being of the opinion that uneconomic hire-purchase terms for electrical apparatus are not in the best interests of the electrical trade as a whole, is studying the possibility of offering the industry considered advice on this most important subject through the medium of the Fair Trading Policy.

A number of other items are occupying the Council's attention at the present time, among them being the question of "group buying" and its effects on the smaller class of electrical trader, and annual rebates and their relationship to quantity terms under the Fair Trading Policy.

Nine Council meetings were held during the year and at the annual general meeting held in Glasgow in October, 1938, Mr. Walter Finlay and Mr. V. Watlington were unanimously re-elected chairman and vice-chairman of the Council and they are continuing during the current year.

The Council is now a certified trade union under the Trade Union Act, 1913. During the year the death occurred of Mr. W. T. Dean, who as late chairman of E.L.F.A. represented that body on the Council during a number of years. Mr. K. Scott Adie (Rowlands Electrical Accessories, Ltd.) was nominated an E.L.F.A. representative in place of Mr. Dean. Representation of E.L.M.A. on the Council has been augmented by Mr. C. H. Cox (Edison Swan Electric Co., Ltd.) and Mr. J. Y. Fletcher (General Electric Co., Ltd.).

The following are now members of the Council:—Messrs. E. S. New and F. C. Vine (Accumulator Makers' Association); Messrs. R. Ball, T. W. Heather and V. Watlington (B.E.A.M.A.); Col. Sir Thomas Purves and Messrs. H. D. Roberts and A. E. Tanner (C.M.A.); Messrs. J. Allan, W. Finlay and A. Lindsay (E.C.A. of Scotland); Messrs. A. J. Burbidge, A. E. Iliffe and K. Scott Adie (E.L.F.A.); Messrs. C. H. Cox, J. Y. Fletcher and C. W. Sully (E.L.M.A.); Messrs. A. Albrecht, A. J. Beaver and A. B. Wildsmith (E.W.F.); Messrs. T. E. Alger, L. C. Penwill and W. H. Walton (N.E.C.T.A.). The Secretary is Mr. Felix A. Rogers, Kern House, Kingsway, W.C.2.

ELECTRICITY SUPPLY

London Companies' Charges. Local Generation Question at Portland. Installations in Warwickshire Wardens' Posts. Loan Terms at Portsmouth

Barking.—RECONNECTION FEES.—At a recent meeting of the Electricity Committee the acting electrical engineer asked for instructions upon the charging of reconnection fees on the return of evacuees to their homes. The town clerk advised that under these circumstances no fee was chargeable.

Blackburn.—FACILITY FOR PAYMENT OF ACCOUNTS.—A strong-box, similar to those used by banks, in which consumers may deposit payments, is to be provided at the Great Harwood showrooms.

COOKERY DEMONSTRATIONS RESUMED.—Cookery demonstrations are again being held by the electricity undertaking at the Darwen Street showrooms.

Braemar.—SUPPLY SCHEME CONTROVERSY.—There has been a hitch in the Braemar electricity scheme. Some of the residents of this Deeside tourist centre lodged objections to the erection of overhead lines by the Grampian Electricity Supply Company on the grounds that the amenities of the district would be marred. The company replied that the difference between the cost of overhead lines and underground mains was £2,500, and unless the County Council was prepared to bear the whole of that cost the company would have to abandon the scheme if underground mains were insisted on. The position was discussed at a recent meeting of the County Public Health Committee when it was decided not to make any recommendation to the Finance Committee to assist in the cost. The chairman, Mr. Frederick Martin, remarked that if the local committee were told that the County Council would not assist it would reconsider the position.

Bromley.—PROPOSED SUB-STATION.—The County of London Electric Supply Co. is to erect a sub-station in Winlaton Road.

Chapel-en-le-Frith.—SUPPLY EXTENSION.—The Rural District Council has approved plans of the Yorkshire Electric Power Co., Ltd., for an overhead line to Bamford.

Ealing.—PRICE INCREASE.—At the November meeting of the Town Council it was reported that an increase in the price of electricity would be necessary. In the New Year the lighting flat rate will be raised from 4½d. to 5½d. per kWh, and other revisions include an increase in the "all in" domestic tariff running charge from ½d. to ¾d.

Eastbourne.—NO INCREASE IN PRICE YET.—It is reported that there is no immediate likelihood of an increase in the price of electricity. Mr. N. Boydell (borough electrical engineer) stated last week that the question of any increase depended largely on the maximum demand in November and December, and he pointed out that consumers could help to keep the "peak" down by not using electric fires between noon and one p.m. in November and December, should there be a cold spell as last year.

Fishburn (Co. Durham).—STREET LIGHTING PAYMENTS.—The Parish Council has decided to ask the parishes of Coxhoe, West Cornforth, Ferryhill, Bishop Middleham, Sedgefield, Trimdon and Chilton to support a protest to the North-Eastern Electric Supply Co., Ltd., against the clause in the street lighting agreements calling upon the Councils to pay, during the "black-out," 50 per cent. of the cost of the energy normally used.

Public Lighting Conference

THE Association of Public Lighting Engineers has arranged a conference between its members and representatives of public lighting committees at St. Ermin's Hotel, Westminster, S.W.1, at 2.30 p.m., on November 28th. At this meeting the general question of public lighting in wartime will be discussed as a means of crystallising points of view. Representatives of any public authority may apply for tickets of admission to the Secretary, A.P.L.E., 13, Victoria Street, S.W.1.

Efforts continue to be made to devise means of reducing road dangers during the "black-out" without assisting enemy aircraft. It is reported in the *Manchester Guardian* that an experiment to make movement about the city streets easier was tentatively tried recently, when the members of the Emergency Committee and police officers inspected a device for lighting tram standards from within. The standards, in Albert Square, had been pierced by a small hole on each side at about 30 in. from the ground and a light had been placed inside and thoroughly screened with red glass.

At Johnstone (Renfrewshire) last week a demonstration of lighting by the ultra-violet-ray system was watched by representatives of a number of local authorities.

Kettering street-lighting authorities are conducting experiments with dim blue lights.

At Poplar a type of lamp is being tried out which shows a blue light towards traffic keeping to the near side of the road, but a red light is seen if vehicles move on to the offside.

Fleetwood.—PRICE INCREASE TO BE RECONSIDERED.—A proposal to increase the price of electricity by 7½ per cent. was referred back by the Urban District Council on November 14th so that it might be discussed in relation to Fleetwood's finances generally.

Glasgow.—DISTRIBUTION EXTENSIONS.—The Electricity Committee is to extend the mains at a cost of £728 to supply a new sub-station on the premises of Collins (Glasgow), Ltd., in Clyde Street and to the Glasgow Workmen's Dwelling Co., Ltd., in Ardgowan Place.

HOSPITAL INSTALLATION.—The Health Committee has agreed to the rewiring of Western District Hospital being commenced. The work will be undertaken by the Electricity Department and up to £1,000 will be spent during the present financial year.

Halifax.—NEW SUB-STATION.—The Town Council is to erect a sub-station in George Street, at an estimated cost of £9,583.

Hebburn-on-Tyne.—LIGHTING IN SHELTERS.—The Urban District Council has instructed the surveyor (Mr. E. G. Lediard) to report on the installation of lighting in air raid shelters.

Hull. — ELECTRIC FIRES FOR A.R.P. SHELTERS.—Last week we referred to the Electricity Department's scheme for encouraging the installation of electric fires in air-raid shelters. The accompanying photograph shows the "Warden" fire which has been designed to the Department's requirements and is being offered at 14s. 6d., including kettle. Arrangements have been made with all fuel overseers for an automatic allowance of 300 kWh per annum where this or any other electric fire is installed in a shelter. Local electrical contractors are canvassing the areas adjacent to their premises and their own customers for the adoption of the scheme.

The "Warden" fire

Leicester.—TARIFF INCREASE UNLIKELY.—At the moment it is unlikely that the rise in the cost of coal will cause any increase in the price of electricity to consumers, states the Electricity Committee.

London.—PRICE INCREASES FORESHADOWED.—Increases in the price of electricity by companies in the London area were foreshadowed last week in a statement by the London Electricity Supply Association in which it was pointed out that apart from evacuation, lighting restrictions had eliminated street lighting, shop and all external illuminations. Hotel, theatre, and social life, and also shopping and other activities had been curtailed. The *Board of Trade Journal* revealed that whereas the retail trade of the country as a whole had decreased very little, in London it had declined by nearly 28 per cent. Because of these and other factors the consumption of electricity in London had been reduced, but some districts, notably the West End, had been more seriously affected than others. With the decline in output there had been a serious increase in working costs. For example, the cost of transporting coal to the Thames had risen so that the total cost of coal was now nearly 50 per cent. above the pre-war price. It was added that price increases would be a matter for individual companies to decide according to conditions prevailing in their areas.

North-East Coast.—ELECTRICITY CHARGES.—It is stated that no tariff increases are contemplated, at any rate for the time being, by the North-Eastern Electric Supply Co., Ltd.

Portknockie.—OVERHEAD LINES ALLOWED.—With regard to the Council's appeal against the proposal of the Grampian Electricity Supply Co. to erect overhead lines in the town, the Ministry of Transport has decided to allow the company to employ this method except in Harbour Road, subject to a review of the question after five years.

Portland.—LOCAL GENERATION: COMMISSIONERS' VIEWS.—The Electricity Committee has received a letter from the Elec-

tricity Commissioners regarding the suggestion that the Council should cease to take a supply of electricity in bulk from the Weymouth Corporation and should establish a generating station of its own. The Commissioners intimated that they could not regard this proposal with favour, particularly during the present war emergency, as it would presumably render redundant capital already expended on the existing bulk supply taken from Weymouth.

Portsmouth.—LOAN TERMS.—In a report to the Council last month the city treasurer (Mr. J. Moffitt) referred to his efforts to secure a loan of £100,000 for a period not exceeding five years. At the last Council meeting the Finance Committee reported that the town clerk had received a letter from the Secretary to the Treasury stating that it did not appear to the Lords Commissioners of the Treasury that at the present time any useful purpose would be served by receiving a deputation on the question of the financing of loans for capital expenditure. It was added that the restrictions on capital expenditure now in force should materially reduce the amount of borrowing required by local authorities, and to that extent the risk of competition between different municipalities referred to in the city treasurer's letter would be lessened. Moreover, present circumstances were different from those obtaining when municipal issues were controlled after the last war, since local authorities were then in competition with each other to raise substantial sums required for housing schemes. The Finance Committee recommended that the town clerk should notify the Electricity Commissioners of the terms of the communication.

Preston.—POWER STATION SCHEME.—Last week the Town Council confirmed a recommendation of the Electricity Committee that there should be extensions at the power station at an estimated cost of £701,453. Alderman A. E. Rhodes (chairman of the Electricity Committee) said that details prepared by the borough electrical engineer (Mr. G. A. Robertson) showed that the extensions would consist of a new generating station adjoining the existing station. This would comprise, in the first stage, a 31,500-kW turbo-alternator set with auxiliary plant and 187,500 lb./hr. boiler units complete with auxiliary plant. Subject to consent by the Electricity Commissioners it was also decided to accept the following estimates for the work:—English Electric Co., Ltd.: Turbo-alternator and condensing plant; feed heating system; pipework; pumps, &c.; switchgear, transformers and all electrical equipment. International Combustion, Ltd.: Boiler plant and steam-raising equipment; coal and ash handling plants; grit arrestor plant. L. G. Mouchel & Partners, Ltd.: All building and civil engineering works, including chimney and circulating water system. The total cost per kilowatt of the first stage is £22.26. This includes considerable expenditure in respect of the second stage to be carried out immediately following the completion of the first stage in 1942. The cost per kilowatt of the two stages will be £18.28. Design and layout have been on the basis of a total ultimate capacity in the new station of 126,000 kW (four 31,500-kW sets).

Southend-on-Sea.—BULK SUPPLY CHARGES.—The borough electrical engineer informed the Electricity Committee recently that he had communicated with the I.M.E.A. suggesting that representations should be made to the C.E.B. urging that some adjustment should be made in the charges for bulk supply, and he submitted a letter from the Association intimating that the matter was receiving attention.

Sutton and Cheam.—A.R.P. INSTALLATIONS.—The Emergency Committee has authorised the work of installing electric lighting in trenches, shelters and basements, &c., at an estimated cost of £1,392.

Swansea.—DATE OF C.E.B. CONTROL.—It was reported to the Electricity Committee last week that intimation had been received from the Central Electricity Board that it had fixed January 1st, 1940, as the date on which operation of the Tir John power station would be subject to the direction of the Board under Section 7 of the Electricity Supply Act, 1926. The Committee accepted, on the recommendation of the borough electrical engineer and manager (Mr. H. E. Blackiston), the consultant (Mr. John Bruce), and the Central Electricity Board, the lower of two tenders, £81,500, for electrostatic flue gas cleaning plant.

Thanet.—INCREASED ELECTRICITY CHARGES.—Electricity charges at Margate, Westgate, Birchington and Broadstairs are to be increased by 15 per cent. immediately, with a possible further increase in three months' time. This is the outcome of a meeting between the Joint Advisory Committee and representatives of the Isle of Thanet Electric Supply Co., Ltd., at the Town Hall, Margate. The increase will be applicable both to the flat rate and two-part tariff consumers, as a special emergency charge.

Warwickshire.—INSTALLATIONS IN WARDENS' POSTS.—A letter has been received by the County Emergency Committee from the Home Office authorising payments for the installation of electric heaters in air raid wardens' posts provided the supply cables are conveniently situated and the cost of installation is small. The Committee has authorised electricity to be installed in newly constructed posts provided the cost of carrying out the work does not exceed £5 10s.

Weymouth.—PROPOSED SUB-STATION.—The Electricity Committee has purchased a site in Nottingley Lane, Broadwey, for the erection of a sub-station.

Whitworth.—NEGOTIATIONS WITH ROCHDALE.—The Urban District Council is to continue negotiations with Rochdale Corporation for a new bulk supply agreement, and is also making inquiries regarding the terms on which the Corporation would be prepared to acquire the Whitworth electricity undertaking.

TRACTION

London.—"UNDERGROUND" EXTENSION. On Monday the extension of the Bakerloo line to Stanmore was inaugurated, within a few weeks of the time originally fixed in spite of delays due to the war. The key engineering works were between Finchley Road and Baker Street, where the existence of only two tracks caused a "bottle-neck." The works between Stanmore and Baker Street necessitated at one time 3,000 men being engaged on building the tracks and stations and laying 430 miles of cable, and have cost £3,250,000. Two and a quarter miles of double tube tunnel has been built between Baker Street and Finchley Road, the Metropolitan tunnels at Finchley Road station have been reconstructed and the line between Finchley Road and Wembley Park rearranged so that fast trains may use the outside and local trains the inside tracks. New tube stations have been built at Swiss Cottage and St. John's Wood, and five other stations reconstructed or altered. Two "fly-under" junctions have been made at Wembley Park by which trains to and from Stanmore and to and from the Neasden depôt will pass underneath instead of across the Metropolitan tracks.

Newcastle-on-Tyne.—LOAN SANCTION REFUSED.—The City Council's application to borrow £29,688 towards the cost of twenty new trolley-buses, estimated at £40,852, has been rejected by the Ministry of Transport, and the Transport Committee recommends that the money should be paid from the trolley vehicles renewals fund. The letter from the Ministry points out that £24,000 was taken from last year's profit of £94,079 for the relief of the general rates, and it would appear that surpluses accrued from day to day to meet the whole cost of the trolley vehicles. The Ministry therefore could not approve the application. The letter refers to the contract placed by the City Council with Northern Coachbuilders, Ltd., Newcastle, for eighteen double-deck bus bodies, and states that the Ministry is not satisfied that the City Council was justified in passing over the lower tenders submitted and would not in any event have been prepared to sanction a loan of £16,830 as applied in respect of these bodies.

Southern Railway.—SUPPLY FAILURE.—Electric trains were delayed, in some cases for over an hour, in the Haywards Heath, Brighton, Lewes, Eastbourne and Hastings districts last Sunday afternoon when the supply from the grid was cut off. The supply to more than 20 villages was also interrupted.

London J.E.A. Decisions

SEVERAL matters of interest came before the meeting of the London & Home Counties Joint Electricity Authority at its meeting last Wednesday. The Emergency Committee reported the appointment of Ald. J. Chuter Ede, M.P., as its chairman and Ald. Dudley Stuart, M.I.E.E., as vice-chairman.

Reference was made to the construction of a main transmission line from Ilford to Woodford at a cost of £17,600 upon which the Technical Committee offered no observations. It was announced that the Electricity Commissioners had approved an agreement for the amalgamation of the undertaking of the London Electric Supply Corporation, Ltd., north of the Thames, with that of Central London Electricity, Ltd. A suitable reserve for the bulk supply to Walton and Weybridge is being arranged.

In a separate report the Committee dealt with the payment of members of staff called up for service or who volunteer with the permission of the appropriate chief officer. It recommended that any such employee who had completed at least six months' continuous service should be granted leave of absence for the period of his service and should receive the difference between his service pay and allowances and his normal civil pay. In the case of canvassers, commission should be taken into consideration. As regards employees below the age of 21 (at which age service with the Authority ceases if there is no vacancy in a higher grade) it was proposed that the remaining period of their service in the Authority's employ should be extended by the period of their leave of absence. These proposals remain subject to rescission or reconsideration by the Authority.

The revised estimates for 1939 show a surplus of £5,750, as against the original estimate of £9,500. For 1940, taking war conditions into account, it appears that there may be a deficit of £84,850 which would increase the accumulated deficit to £213,240. The Committee has had under consideration the steps to be taken to deal with the position and has arranged for representatives of the Authority to meet the Electricity Commissioners at an early date with a view to submitting proposals to the Authority.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. *each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

1937

13039. "Means for converting electric currents." W. Needham and S. Robinson. April 29th, 1938. (513841.)

28153. "Electrodes for electro-medical apparatus." C. A. Cooper. October 17th, 1938. (513938.)

1938

2289. "Telephone instruments." United States Instrument Corporation. December 4th, 1937. (513895.)

5604. "Television, telecinematograph and like systems." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. February 27th, 1937. (513038.)

7448. "Switching - apparatus suitable for indicating the magnitude of a transient or abnormal condition in an electric circuit." W. T. J. Atkins, Nalder Bros. & Thompson, and C. L. Lipman. March 9th, 1939. (513844.)

8729. "Protective covers for sparking plugs and the electrical connections thereto." E. Williams. March 22nd, 1938. (514041.)

9094. "Electrical condensers." A. H. Hunt, Ltd., and J. H. Fisher. March 24th, 1938. (513913.)

10807. "Projection arc lanterns." British Thomson-Houston Co., Ltd., H. Trencham and F. A. Tuck. April 8th, 1938. (513851.)

11858. "Cable-end insulators, more particularly for metal-clad switchgear." British Thomson-Houston Co., Ltd., and J. M. Goodall." April 20th, 1938. (514054.)

11938. "Visual voltage indicators." Marconi's Wireless Telegraph Co., Ltd. April 21st, 1937. (513859.)

11983. "Multi-contact electro-magnetic relays." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). April 21st, 1938. (513864.)

11985. "Thermionic amplifiers." Standard Telephones & Cables, Ltd., and A. H. Roche. April 21st, 1938. (Addition to 506765.) (514055.)

11987. "Control devices for flame or temperature-operated electric switches." Graviner Manufacturing Co., Ltd., A. Mathisen and H. M. Salmond. April 21st, 1938. (513920.)

12026. "Electric relays." J. Gray and Metropolitan-Vickers Electrical Co., Ltd. April 21st, 1938. (513922.)

12031. "Telephone apparatus." J. T. Shevlin. (Siemens Apparate und Maschinen Ges.) April 21st, 1938. (513869.)

12096. "Apparatus for enamelling or varnishing wires." Insulatus Akt.-Ges. April 24th, 1937. (513872.)

12097. "Apparatus for wiping excessive coating material from wires." Insulatus Akt. Ges. April 24th, 1937. (513873.)

12098. "Drying-oven for varnished or enamelled wires." Insulatus Akt. Ges. April 24th, 1937. (513874.)

12108. "Welding of wires." Edison Swan Electric Co., Ltd., and A. Hannaford. April 22nd, 1938. (513946.)

12123. "Scanning oscillators for use in television and like systems." Fernseh Akt. Ges. April 24th, 1937. (513878.)

12126. "Electron multipliers." Fernseh Akt. Ges. April 23rd, 1937. (513879.)

12132. "Metal-vapour electric-discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. April 22nd, 1938. (513948.)

12134. "Projecting lamps." M. C. Harley. April 22nd, 1938. (513880.)

12146. "Appliance for the hygienic protection of telephones which incorporate a combined mouthpiece and earpiece." L. F. Richardson and V. J. Faulkner. April 22nd, 1938. (513881.)

12186. "Electrical condensers." A. H. Hunt, Ltd., and J. H. Fisher. April 23rd, 1938. (513950.)

12189. "Dynamo-electric machines." E. W. Krebs. April 23rd, 1938. (513951.)

12196. "Thermionic amplifiers." Standard Telephones & Cables Co., Ltd., B. B. Jacobson and A. H. Roche. April 23rd, 1938. (513059.)

12223. "Electric valve circuits." British Thomson-Houston Co., Ltd. April 24th, 1937. (514956.)

12230. "Adjusting or selecting mechanism for the tuning controls of wireless apparatus." Plessey Co., Ltd., P. J. Packman and P. H. Morrison. April 23rd, 1938. (514060.)

12237. "Electric cables and joints therefor." C. J. Beaver, E. L. Davey and W. T. Glover & Co., Ltd. April 23rd, 1938. (513959.)

12249. "Loop aerials and the like." Pye, Ltd., W. A. St. C. Smith and J. W. Dalgleish. April 23rd, 1938. (513961.)

12254. "Electro-deposition of nickel." W. J. Tennant (Eaton Mfg. Co.). April 23rd, 1938. (513963.)

12273. "Pre-set tuning of radio receivers." Murphy Radio, Ltd., G. B. Baker and J. D. A. Boyd. April 23rd, 1938. (513965.)

12340. "Frequency dividers." Marconi's Telegraph Co., Ltd. April 23rd, 1937. (514063.)

12341. "Electrical wave filters." Marconi's Wireless Telegraph Co., Ltd. April 24th, 1937. (514064.)

12343. "Thermionic valve circuits." A. D. Blumlein. April 25th, 1938. (514065.)

12344. "Electrical tuned circuits." Marconi's Wireless Co., Ltd. April 23rd, 1937. (513970.)

12353. "Illuminated advertising devices." M. Jacoby. April 25th, 1938. (Convention date not granted.) (514003.)

12357. "Electric valve circuits." British Thomson-Houston Co., Ltd. April 24th, 1937. (514004.)

12358. "Electric motor control systems." British Thomson-Houston Co., Ltd. April 24th, 1937. (514005.)

12359. "Electric valve circuits." British Thomson-Houston Co., Ltd. April 24th, 1937. (514066.)

12360. "Starter motor arrangements for internal-combustion engines." Petters, Ltd., and P. J. Swaffield. April 25th, 1938. (513973.)

12367. "Regulating and indicating apparatus for regulating the voltage of several transformers adapted to run in parallel." Soc. Savoisienne de Constructions Electriques. April 27th, 1937. (514067.)

12483. "Lighting fittings for supporting globes or the like." General Electric Co., Ltd., and A. J. Burbidge. April 26th, 1938. (514013.)

24125. "Electric control systems." A. A. Thorton (H. F. Vickers). August 16th, 1938. (513978.)

24845. "Thermionic amplifier stages." Hazeltine Corporation. September 25th, 1937. (514073.)

25185. "Electromotors and the propulsion of vehicles." E. J. Perriolat August 26th, 1937. (514020.)

25223. "Apparatus for separating the picture components according to colour from the brightness components in coloured television pictures (scenes and the like). K. H. Kerber. September 11th, 1937. (514021.)

27835. "Push-button tuning devices for radio receiving." Crosley Radio Corporation. February 24th, 1938. (Cognate applications 27836/38 and 27837/38.) (514026.)

29429. "Means for regulating the piston stroke in electric welding-machines." Knorr-Bremse Akt.-Ges. October 19th, 1937. (514031.)

29841. "Electric filter arrangements." C. Lorenz Akt.-Ges. October 19th, 1937. (514074.)

32670. "Television scanning systems." Hazeltine Corporation. December 2nd, 1937. (513983.)

32671. "Television scanning systems." Hazeltine Corporation. December 2nd, 1937. (513984.)

35613. "Means for converting polyphase electric currents." W. Needham and S. Robinson. April 29th, 1938. (Divided out of 513841.) (513885.)

35614. "Means for converting electric currents." W. Needham and S. Robinson. April 29th, 1938. (Divided out of 513841.) (513886.)

1939

5528. "Radio landing control system." G. L. Davies. February 20th, 1939. (514080.)

19905. "Collector heads or current collectors for trolley buses and the like." R. Livingstone and Anti-Attrition Metal Co., Ltd. December 31st, 1937. (Divided out of 508686.) (513889.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month of November 15th:—

Mazdalux. No. 608431. Class 2 (IV). Paints, varnishes (other than insulating varnish), and lacquers.—The British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.

Brabro. No. 609353. Class 6 (IV). Metals for welding, soldering and brazing.—The Francois Cementation Co., Ltd., 701, Salisbury House, E.C.2.

Seco. No. 606238. Class 7 (IV). Electric washing machines, floor polishing machines (not domestic), dish washing machines, &c. No. 606240. Class 9 (IV). Electric vacuum cleaners, irons, and domestic floor polishing machines.—Sterling Engineering Co., Ltd., Sterling Works, High Road, Dagenham, Essex.

GE (lettering and design). No. 608135. Class 10 (IV). X-ray tubes and X-ray apparatus.—International General Electric Co., Inc., New York, U.S.A. (British representative: Charles H. Burgess, Crown House, Aldwych, W.C.2.)

Sirius. No. 609224. Class 11 (IV). Electric lamps (ordinary)—E. K. Cole, Ltd., Ekco Works, Priory Crescent, Southend-on-Sea.

Elektron. No. 605292. Class 12 (IV). Parts of land, air and water vehicles.—Magnesium Elektron, Ltd., Abbey House, Baker Street, London, N.W.1.

I.E.E. Members on Service

THE November issue of the I.E.E. *Journal* contains the first list of 268 members of the Institution of Electrical Engineers on service with H.M. Forces, with their units and ranks. This first list contains the names of 12 members, 122 associate members, 10 associates, 112 graduates, 12 students and 5 members of the I.E.E. staff who are now serving. It is proposed to publish further lists of promotions, transfers, military honours awarded, &c.

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

H. Wynn & Co., Ltd.—Private company. Registered October 27th. Capital, £500. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, cookers, glass, pottery, electrical plant, etc. E. A. Wynn, 1353, Ashton Old Rd., Higher Openshaw, Manchester, is permanent governing director. Solicitors: Crofton, Craven & Co., 36, Brazennose St., Manchester.

R. & S. Robertson, Ltd.—Private company. Registered in Edinburgh November 2nd. Capital, £4,000. Objects: To carry on the business of dealers in all electrical fittings and accessories, radio, wireless, &c. Directors: R. H. Robertson, 43, Spottiswoode Road, Edinburgh, S. W. H. Robertson, 13, Orchardfield Avenue, Edinburgh, and H. A. Stewart, 3, St. Catherines Place, Edinburgh. Registered office: 53, Frederick Street, Edinburgh.

Holms Electrical and Engineering Co., Ltd. — Private company. Registered November 2nd. Capital, £5,000. Objects: To carry on business as electrical engineers and general electrical installation contractors, &c. Subscribers: F. A. White, 112, Newfoundland Road, Cardiff, and D. C. Mann, 6, Fairleigh Road, Pontcanna, Cardiff. Registered office: Imperial Buildings, Mount Stuart Square, Cardiff.

Otley Relay Radio Services, Ltd.—Private company. Registered November 6th. Capital, £3,000. Objects. To carry on the business of television and wireless electricians and engineers, electrical and mechanical engineers, &c. The first director is H. J. Lee, 26, Arbor Drive, Burnage, Manchester. Registered office: 58, Boroughgate, Otley.

Arthur Bowman, Ltd.—Private company. Registered November 13th. Capital, £500. Objects: To acquire the business of a radio and electrical engineer carried on by A. Bowman at 457, Chillingham Road, Newcastle-on-Tyne, 6. Directors: A. Bowman, 36, Bretton Gardens, Heaton, Newcastle-on-Tyne, 6; and E. H. Bell, 134, Rothbury Terrace, Heaton, Newcastle-on-Tyne, 6. Registered office: 457, Chillingham Road, Newcastle-on-Tyne, 6.

Companies' Returns

Statements of Capital

Child's Electrical Stores, Ltd.—Capital, £1,000 in £1 shares. Return dated July 12th. 1,000 shares taken up. £2 paid. £998 considered as paid. Mortgages and charges £502 15s.

Auto Electrical Repairs, Ltd.—Capital, £1,000 in £1 shares. Return dated July 19th. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Spensers (London), Ltd. — Capital, £12,000 in £1 shares. Return dated May 21st. 10,553 shares taken up. £2,553 paid, £8,000 considered as paid. Mortgages and charges: £3,000.

Playford & Son, Ltd.—Capital, £2,000 in £1 shares. Return dated July 5th. 1,214 shares taken up. £1,214 paid. Mortgages and charges: £100.

Pennington, Stevens & Taylor, Ltd.—Capital, £7,000 in £1 shares. Return dated July 20th. 6,912 shares taken up. £6,762 paid, £150 considered as paid. Mortgages and charges nil.

H. C. W. Elton, Ltd.—Capital, £800 in £1 shares. Return dated September 5th. 570 shares taken up. £570 paid. Mortgages and charges nil.

Willmott, Son & Phillips, Ltd.—Capital, £1,000 in £1 shares. Return dated September 1st. 501 shares taken up. £501 paid. Mortgages and charges nil.

Watsham's, Ltd.—Capital, £25,000 in £1 shares. Return dated August 3rd, 1939. 15,500 shares taken up. £2,921 paid. £12,579 considered as paid. Mortgages and charges, nil.

E. P. Cottier, Ltd.—Capital, £1,000 in £1 shares. Return dated July 6th, 1939. 690 shares taken up. £690 paid. Mortgages and charges nil.

W. J. Henderson & Co., Ltd.—Capital, £3,000 in £1 shares. Return dated July 3rd, 1939. All shares taken up. £745 paid. £2,255 considered as paid. Mortgages and charges, nil.

Allen & Welsby, Ltd.—Capital, £1,500 in £1 shares. Return dated August 16th, 1939. 1,060 shares taken up. £1,060 paid. Mortgages and charges, nil.

"M. K." Electric, Ltd.—Capital, £300,000 in 100,000 6 per cent. preference and 200,000 ordinary shares of £1. Return dated July 7th. All shares taken up. £768 paid. £299,232 considered as paid. Mortgages and charges, £6,600.

Ever Ready Electric Bulb Co., Ltd.—Capital, £10,000 in £1 shares. Return dated August 18th. 2,500 shares taken up. £2,500 paid. Mortgages and charges, nil.

Johnson & Co. (Bradford), Ltd.—Capital, £1,000 in 500 preference and 500 ordinary shares of £1. Return dated October 3rd. 500 ordinary shares taken up. £500 paid. Mortgages and charges, nil.

Hagger & Hawes, Ltd.—Capital, £100 in £1 shares. Return dated September 29th. 61 shares taken up. £61 paid. Mortgages and charges, nil.

Edward Wilcox & Co., Ltd.—Capital, £5,000 in 900 7 per cent. cumulative preference and 4,100 ordinary shares of £1. Return dated July 10th. 900 preference and 3,801 ordinary shares taken up. £4,301 paid on 600 preference and 3,701 ordinary shares. £400 considered as paid on 300 preference and 100 ordinary shares. Mortgages and charges, £4,199 8s.

Patterson Lamps, Ltd.—Capital, £15,000 in £1 shares. Return dated August 23rd. 14,500 shares taken up. £6,330 paid. £8,170 considered as paid. Mortgages and charges, nil.

Economic Electric Company (Liverpool), Ltd.—Capital, £10,000 in £1 shares. Return dated September 5th. 8,300 shares taken up. £8,300 considered as paid. Mortgages and charges, £2,866.

Stokes Appliances, Ltd. — Capital, £5,000 in £1 shares. Return dated September 22nd. 403 shares taken up. £403 paid. Mortgages and charges, nil.

Mortgages and Charges

Young & Wildsmith, Ltd.—Particulars filed of £4,500 debentures, authorised October 26th, 1939, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued. The above debentures rank in priority to those authorised October 4th, 1933.

L. H. Farmiloe, Ltd. — Debenture charged on the company's property, present and future, including uncalled capital, dated October 21st, 1939, to secure £1,000. Holder: Miss Gladys L. Wood, 180, Woodend Road, Erdington, Birmingham.

St. Mary's (Scilly) Electricity Supply Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated October 28th, 1939, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

M. W. Woods, Ltd.—Mortgage on house and premises at Tufnell Way, Braiswick, Colchester, dated November 7th, 1939, to secure £375. Holders: Colchester Equitable Building Society.

Increases of Capital

Staveley Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 shares beyond the registered capital of £10,000.

Carlisle Electrical Manufacturing Co., Ltd.—The nominal capital has been increased by the addition of £3,000 beyond the registered capital of £2,000.

Receiver Released

A. L. Turner, Ltd.—G. T. West, of 6, Brown Street, Manchester, ceased to act as receiver and manager on October 30th, 1939.

Company Liquidations

G. F. Latham, Ltd., electrical contractors, 8, Chatham Street, Manchester.—At the statutory meeting of the creditors held on November 17th at the offices of Trotter, Davies & Yearsley, Manchester, it was reported that the ranking liabilities were £423 with a deficiency, as regarded the creditors, of £228. The issued capital was £308, and so far as the shareholders were concerned there was a deficiency of £536. It was decided that the voluntary liquidation of the company should be continued with Mr. J. B. Yearsley, C.A., Manchester, as liquidator. A committee was also appointed.

The British Blue Spot Co., Ltd., Sterling Works, Dagenham, Essex.—A statement of affairs which has been lodged in this compulsory liquidation discloses gross liabilities of £16,697, of which £12,176 is expected to rank for dividend. The assets, estimated to realise £4,522, are absorbed by preferential and debenture claims. The issued capital of the company is £80,000 and there is a total deficiency of £92,176. One of the directors of the company ascribes the failure mainly to inability to design and manufacture a type of wireless set of sufficient quality to enable it to continue to take advantage of the high degree of goodwill in the wireless trade established for the "Blue Spot" name.

Elmore Electric Clocks, Ltd.—Particulars of claims by November 30th to the liquidator, Mr. T. G. Piper, Bush Lane House, Cannon Street, E.C.4. Meetings December 14th to receive an account of the winding up by the liquidator.

D. C. Electric Co., Ltd.—Meetings December 15th at the offices of Mr. T. S. Bartlett, solicitor, Greenhill, Sherborne, Dorset, to receive an account of the winding up by the liquidator, Mr. F. V. L. Redman.

Thompson & Dean, Ltd.—Winding up voluntarily. Liquidator, Mr. F. E. Bendall, King Edward House, New Street, Birmingham. Particulars of claims to the liquidator by December 20th.

Protos Electric Appliances, Ltd.—Winding up voluntarily. Liquidator, Mr. A. F. de Reya, 15-18, Lime Street, London, E.C.3.

Neon Advertisements, Ltd.—Winding up voluntarily. Liquidator, Mr. P. S. Booth, 5, Rumford Place, Liverpool, 3.

Bankruptcy Proceedings

S. Burgoyne, electrician, 1, Mill Lane, Ferrybridge Road, Pontefract.—Receiving order made November 7th on debtor's own petition.

E. M. Jones, electrical engineer, 26, Eastgate, Aberystwyth.—Last day for receiving proofs for dividend November 24th. Trustee, Mr. H. W. Thomas, 4, Queen Street, Carmarthen.

T. C. Taylor, electrical contractor, 20, Queen Street, Blackpool.—Application for discharge to be heard on December 20th at the Courthouse, Blackpool.

T. E. Perks (Ross & Perks), electrical engineer, 166, Piccadilly, London.—Discharge suspended for two years until October 17th, 1941.

C. E. Ross (Ross & Perks), electrical engineer, 166, Piccadilly, London.—Discharge suspended until October 17th, 1941.

R. S. Wright, wireless dealer, 33, Broomfield Road, Coventry.—Discharge

Continued on page 691.

STOCKS AND SHARES

TUESDAY EVENING.

THE impression that the Government is about to unfold its plan for the issue of the new Defence Loan is thought to be one reason why business in Stock Exchange securities has shown a disposition to dwindle during the past few business days. Prices have held up remarkably well. The War Loan, for example, rose to 92⅝, the highest price reached since the outbreak of war and 4⅜ above the minimum price fixed at the end of August.

Though the top prices were not maintained, the gilt-edged markets and those for the best-class industrial shares remain very firm. Central Electricity, West Midland, and London Passenger Transport stocks are better. A feature in the communications list is a jump in the prices of the Cable and Wireless ordinary and preference stocks. Home electricity supply shares show decided firmness. In the equipment and manufacturing group the strength of Lucas, Ericsson Telephones and Automatic Telephone stands out prominently. The Argentine Tramway list has gone ahead, although it is stated that there will be a further postponement, until the end of next month, of the plan for unification of the urban system into the Buenos Aires Transport Corporation. Anglo-Argentine Tramways income debenture is 3½ points up.

Gilt-edged Strength

The week's business in the gilt-edged market has been patchy, but with more buyers than sellers in evidence. The result is seen in a general hardening of prices. Interest in the Government's borrowing intentions becomes yet more keyed-up as the time passes with no pronouncement. Recent legislation has cleared the decks for an immediate issue, but the secret is kept with traditional fastness. According to the popular tip the psychological moment will come early in December: a great amount of money is released on the first of that month in the shape of the half-yearly interest on the War Loan. Speculation is plentiful and various as to the prices and terms of the forthcoming loans. One certain consideration is that, thanks to the big rise in gilt-edged descriptions, the Treasury will be able to obtain this year's loan requirements of about £1,000,000,000 at a materially lower rate of interest than seemed possible a few weeks ago, when even the fixed minimum prices attracted no buyers. Those minima have been left well behind by the pressure of stock absorption that still persists.

Central Electricity Board Issues

These stocks are consistently well supported by investment seeking better yields than those obtainable from Trustee issues, but still with security of a high order. After a rise of several points above the minimum prices, very little stock is coming forward to satisfy the demand. Would-be buyers at present prices are having to wait for the offer of stock. When obtainable, the various issues offer running yields that range between 4 and 4¾ per cent. Allowing for the profit or loss on redemption, the returns do not exceed 4½ per cent. The best current yield is on the 5 per cents., redeemable 1950/70, which, at 106½, pay nearly 4¾ per cent. on the money. Allowing for loss on redemption at the earlier of the dates, the return is 4¼ per cent. On the 3½ per cent. stock, 1963/93, at 88, the yield is practically 4 per cent., and a shade above this when taking into account the capital profit at the farther redemption date. It is interesting to note that these yields are a fraction better than the returns obtainable from the well-secured debentures of the big electricity supply companies.

County of London Electric

Although the shares of this company—one of the largest electricity undertakings in the country—have recovered to 36s. 3d., after being down to 28s. in this year's blackest market days, the yield of 5.8 per cent. is still conspicuously high by comparison with others in the same market. The reason is to be found, it seems, in the special regulations which apply to the supply of electricity in London and the limitations which these set to dividends when the so-called "standard" prices for energy are reached or exceeded. It is thought that rising costs may force selling prices upwards. This influences the market in quoting the shares at a price leaving a margin for the contingency of some small reduction in the current 10½ per cent. dividend. At the same time, it is not forgotten that the company has profitable holdings in supply companies outside the London area. The former considerations would account equally for the yields of nearly 7½ per cent. on London Associated, 6¼ per cent. on "City Lights," and 6½ per cent. on Metropolitans.

Cable and Wireless

After a quiet spell, with prices round about the levels ruling at the end of August, Cable and Wireless issues began this week to show signs of fresh life. It may be that opinion has been slow to appreciate the possibilities in connection with the wartime flow of cable messages and the first-class strategic importance of the services. The monthly traffic index was discontinued, as being misleading in its indications, before hostilities began, so that there is no way of gauging even roughly the way in which the war has contributed to cable business. Nevertheless, the inclination is to regard the 4 per cent. dividend paid for last year on the holding company's ordinary stock as being among the more assured events in the uncertain future. Both the ordinary and preference stocks have each risen 4 points this week. The latter stock, at 89½, offers a yield of £6 3s. per cent. The ordinary, on a 4 per cent. dividend calculation, gives £7 12s. 4d. per cent.

Company News

On publication of the annual report, the 10s. shares of Electrical Switchgear and Associated Manufacturers picked up a few pence of the setback occasioned by the cut in the dividend from 16 to 10 per cent. The report refers to the lowness of selling prices in a period when costs were rising and when the generally unsettled conditions were hindering production. Net profits of the operating concern, Brookhirst Switchgear, were £19,000, against £34,000 in the year before. At 21s. 3d., the holding company's shares yield 4¾ per cent. Crabtree Electrical Industries 10s. shares remained firm at 21s. 3d. on the chairman's satisfactory account of business at the annual meeting. This company is also, in the main, a holding company, revenue coming by way of dividends paid by the subsidiary J. and A. Crabtree. The shares are in the high-yielding category, the return at the present price of 21s. 3d. being 8¼ per cent. on the money. A feature of the balance sheet is the presence of ample cash and other liquid resources.

Equipment and Manufacturing

J. Lucas shares, which have been in good demand since the publication of an excellent report, have added 2s. 3d. this week to previous improvements. With the shares now 51s. 3d., the yield on the last dividend of 15 per cent. is down to less than 6 per cent. Johnson & Phillips, at 40s., yield 6¼ per cent. on the basis of the 12½ per cent. dividend paid for the last year, without taking account of the recent decision to raise the interim payment from 5 to 7½ per cent. It would require no more than a repetition of last year's final dividend to bring the yield up to 7½ per cent. The price of the shares is 5s. higher than it was a fortnight ago. The list of electrical equipment shares has few changes to show this week, the rise of ¼ to 42s. 6d. in Automatic Telephones being one of the few features. In the more general sections, British Thermostats at 12s. 6d., Electric & Musical Industries at 7s. 3d., English Electrics at 30s. 9d., and British Aluminiums at 50s. 9d., are all a little lower.

Shortage of Shares

Reference has been made here on various occasions to the shortness of supply available in the case of the shares of a number of industrial companies, especially those of the best class groups. Shortage of shares is noticeable in the market for equipment companies. It is difficult to get the offer of any reasonable number of shares at the current market price.

No doubt people remember that after the last war most of the equipment companies emerged successfully, and in a better condition than they were when the war started. Something of the same kind is expected to happen this time, and people are anxious to get hold of shares where they can do so at current market figures. But the usual sellers are not anxious to part from their interests in the face of future possibilities.

Callender's

It may be of service to point out that there are about 2,000 Callender's £1 shares on offer in the market at 60s. The company disappointed its stockholders, it may be recalled, by declaring a dividend that made 15 per cent. for the year last March, as compared with the 20 per cent. that had been paid in each of the two previous years. There is an impression in the Stock Exchange market that Callender's acted on this occasion with extreme caution, and that, had it not been for the fact of an international crisis, the company would probably have continued its 20 per cent. dividend. The chairman outlined the reasons that had weighed with the board in reducing the dividend; and, at the meeting on June 8th, he stated that it was only within the last month that a return to more normal conditions had been experienced.

No doubt the outbreak of war has again upset the normal course of events, but Callender's at £3 a share, and with a 15 per cent. dividend, cannot be considered expensive. There is scope for improvement in the dividend, and, concurrently, appreciation in capital value.

Cash Dealings

Since the suspension of the usual fortnightly settlements and the ban on carry-over facilities, all Stock Exchange bargains in stocks and shares are done for cash. This change has not been without its effect upon market conditions. It means that, to all intents and purposes, no one is buying stock without the intention and the means to pay for it. Genuine investment of this kind is in no hurry to part from its holdings, and is unlikely to be jolted out of them by shock or disturbance. For another thing, the cash rule renders it extra hazardous for market dealers to take or supply stock without having a reverse order in sight. The stimulating and enlivening activity of the short-term speculator is absent; the taker of quick profits no longer helps to sustain the level of the floating supply of stock. These factors help to explain why it is that buyers find great difficulty in obtaining anything like large amounts of certain gilt-edged stocks, of debentures, of preference, and of ordinary shares. Incidentally, the conditions make a firm foundation for improvement in prices.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price Nov. 21	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole ...	68/3	57/–	15	15	58/9	—	5 2 0
British Power and Light ...	30/9	21/–	7	7	26/–	+1/–	5 7 8
City of London	33/9	23/6	7½	7½	24/6	+6d.	6 2 5
Clyde Valley	37/9	27/6	8	8	33/3	—	4 16 3
County of London ...	46/9	28/–	10½	10½	36/3	—	5 16 0
Edmundson's :							
7% Pref....	31/6	27/6	7	7	28/–	—	5 0 0
Ord.	27/9	18/6	9	6	23/6	—	5 2 2
Elec. Dis. Yorkshire ...	41/6	32/6	9	9	35/9	+9d.	5 0 5
Elec. Fin. and Securities ...	47/9	40/–	12½	12½	40/–	—	6 5 0
Elec. Supply Corporation...	51/9	41/–	12	12	41/3	—	5 16 0
Isle of Thanet	20/–	15/–	4	4	15/–	—	5 6 8
Lancs Light and Power ...	34/6	25/–	7½	7½	30/–	+1/9	5 0 0
Llanelly Elec.	22/6	17/6	5½	5½	18/–	—	6 2 3
Lond. Assoc. Electric ...	30/–	18/9	7	7	18/9	—	7 9 4
London Electric	34/3	22/6	7	7	25/–	—	5 12 0
London Power Deb. Red....	106½	98	5	5	103½	—	4 16 6
Metropolitan	51/–	35/–	12	12	37/–	—	6 9 9
Midland Counties	38/9	30/–	8	8	35/–	—	4 11 5
Mid. Elec. Power	41/9	35/–	8	9	36/3	—	4 19 4
Newcastle Elec.	28/9	26/–	7	7	26/3	—	5 6 8
North Eastern Electric :							
Ordinary...	32/3	23/6	7	7	27/6	—	5 1 10
7% Pref....	32/6	27/6	7	7	29/6	—	4 16 7
Northampton	48/–	41/–	10	10	42/6	—	4 15 0
Notting Hill 6% Pref. (£10)	12½	11½	6	6	11½	—	5 4 4
Northmet Power :							
Ordinary...	46/6	30/6	10	10	37/6	—	5 6 8
6% Pref....	29/–	23/6	6	6	27/–	—	4 9 0
Richmond Elec.	29/–	21/6	7	7	23/9	—	5 18 0
Scottish Power	38/9	28/6	8	8	32/6	—	4 18 6
Southern Areas	22/9	17/–	5	5	18/–	—	5 11 1
South London	30/9	23/9	7	7	22/–	—	6 7 3
West Devon	23/3	18/9	5	5	18/9	—	5 6 8
West Glos	21/3	16/3	2	2½	16/3	—	3 1 6
Yorkshire Elec.	38/6	28/9	8	8	33/9	—	4 14 10
Overseas Electricity Companies							
Atlas Elec.	4/3	1/6	Nil	Nil	2/6	+9d.	—
Calcutta Elec.	39/–	25/–	10*	10*	30/6	—	—
Cawnpore Elec.	34/6	28/3	10	10	27/6	—	—
East African Power ...	26/3	20/–	7	7	22/6	—	6 17 4
Jerusalem Elec.	24/6	21/–	7	7	21/–	—	6 13 4
Kalgoorlie (10/–)	10/6	9/–	7½	7	10/–	—	7 0 0
Madras	31/–	21/3	8*	8*	21/3	—	—
Montreal Power	35¼	30	1½	1½	32½	+½	—
Palestine Elec. "A" ...	29/6	20/–	7½*	5*	25/0	—	4 0 6
Perak Hydro-electric ...	18/9	13/6	6	2½	18/3	—	2 14 9
Shawinigan Power ...	24	20	85cts.	83cts.	24	−½	—
Tokyo Elec. 6%	61	37	6	6	60½	—	9 18 4
Victoria Falls Power ...	73/9	60/–	12½	15	68/9	—	4 7 3
Whitehall Investments Pref.	19/6	12/6	7½	7½	14/–	—	10 14 2
Public Boards							
Central Electricity :							
1950–70	112	103	5	5	106½	+1	4 14 0
1955–75	115¼	104½	5	5	107	+1½	4 13 6
1951–73	106½	101	4	4½	104	—	4 6 3
1963–93	95½	84	3½	3½	88	+2	3 19 7
London Elec. Trans. Gtd.	88½	83	2½	2½	87	—	2 17 6
London & Home Counties							
1955–75	107½	105	4½	4½	107	+1½	4 4 1
Lond. Passenger Transport :							
A	114½	103	4½	4½	106½	+1½	4 4 6
B	117½	102	5	5	105	—	4 15 3
C	83½	64½	4	1½	65	—	2 6 2
West Midland Joint Elec.,							
1948–68	112½	104½	5	5	106	+1½	4 14 4
Telegraph and Telephone							
American Tel. & Tel. ...	210	159	9	9	210	+5	4 5 8
Anglo-Am. Tel. :							
Pref.	101½	82	6	6	88½	+1½	6 15 7
Def.	23⅜	18½	1½	1½	20½	+½	7 16 4
Anglo-Portuguese	24/–	17/6	8	8	19/6	+9d.	8 4 2
Cable & Wireless :							
5½% Pref.	95½	75	4½	5½	89½	+4	6 3 0
Ord.	55	34	4	4	52½	+4	7 12 4
Income	100	87½	—	—	89½	—	4 9 5
Canadian Marconi $1 ...	6/–	3/9	—	Nil	5/3	−3d.	—
Globe Tel. & Tel. :							
Ord.	31/3	23/6	7½*	7½*	26/3	—	6 0 0
Pref.	26/9	22/6	6	6	25/–	—	4 16 0
Great Northern Tel. (£10)	38	25	20	20	24½	−1	8 3 4
Inter. Tel. & Tel.	10½	5½	Nil	Nil	6½	—	—
Marconi-Marine	30/–	23/–	7½	10	26/3	—	7 12 4
Oriental Telephone Ord. ...	2½	46/3	12*	12*	2⅜	—	5 4 0
Radio Corpn.	8⅝	5⅜	8	6	7½	—	—
Telephone Props.	14/–	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/–) ...	10/–	7/–	10	10	8/–	—	6 5 0
Western Union	40½	19½	2½	—	35½	—	—
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	7/6	3/6	Nil	Nil	5/–	+⅛	—
4% Inc.	16	5	Nil	Nil	13	+3½	—
British Electric Traction :							
Def. Ord.	1025	515	5	5	700	—	—
Pref. Ord.	164	130	8	8	142	−3	5 12 8
Bristol Trams	52/6	36/3	8	10	42/–	—	4 15 5
Brazil Traction	13	7½	$1	50c.	9	—	—
Calcutta Trams	25/6	20/9	8	8	21/3	—	7 10 6
Cape Elec. Trams	18/–	16/9	5	5	17/6	—	5 14 4
Lancs Transport	37/9	27/6	10	10	30/–	—	6 13 4
Mexican Light :							
1st Bonds	25	20	5	5	27½	—	—
Rio 5% Bonds	81	47	5	5	70	—	7 2 10
Southern Rly. :							
5% Prefd.	75½	48	5	5	57½	+½	8 14 0
5% Pref....	99½	79	5	5	84	—	5 6 3
T. Tilling	2½	32/6	10	10	38/3	—	5 4 7
Tilling & B.A.	54/6	43/9	10	9*	45/–	—	4 2 3
West Riding	37/9	30/–	10	10	30/–	—	—
Equipment and Manufacturing							
Aron Electricity Ord. ...	32/3	25/–	15	15	25/–	—	12 0 0
Assoc. Elec. :							
Ord.	45/3	31/3	10	10	40/–	—	5 0 0
Pref.	36/6	31/3	8	8	32/6	—	4 18 6
Automatic Telephone & El.	47/6	39/3	10	12½	42/6	+½	5 17 8
Babcock & Wilcox ...	48/–	37/–	10	12½	40/–	−½	6 5 0
British Aluminium Ord. ...	58/9	48/9	12½	12½	50/9	−⅛	4 18 5
British Insulated Ord. ...	88/–	72/6	20	20	77/6	—	5 3 1
British Thermostat (5/–)...	16/–	12/–	18½	18½	12/6	—	7 8 0
British Vacuum Cleaner (5/–)	22/6	12/6	40	40	12/6	—	—
Brush Ord.	5/9	4/–	Nil	Nil	3/9	—	—
Callender's	92/–	52/6	20	15	60/–	—	5 0 0
Chloride Elec. Storage ...	82/3	62/6	20	15	3/8xd.	+3/–	4 18 9
Consolidated Signal ...	96/–	75/–	36½	36½	65/–	—	9 14 8
Crabtree (10/–)	25/6	17/6	17½	17½	21/3	—	8 4 9
Crompton Parkinson :							
Ord. (5/–)	21/–	12/6	12½	15	17/6	—	—
E. K. Cole (5/–)	9/–	3/–	10	Nil	4/6	—	—
Elec. & Musical Industries (10/–)	14/9	7/–	5	Nil	7/3	−9d.	8 8 10
Electric Construction ...	38/6	31/–	12½	13½	32/–	—	7 4 5
Enfield Cable Ord. ...	58/6	42/6	25	16½	45/–	—	7 8 5
Electrical Switchgear (10/–)	27/–	21/–	16	10	21/3	+3d.	4 14 3
English Electric	36/6	25/–	10	10	30/9	−6d.	6 10 4
Ensign Lamps (5/–) ...	16/9	13/9	—	25	15/–	—	8 6 8
Ericsson Tel. (5/–) ...	43/–	35/–	25*	25*	37/6	+1/8	3 6 8
Ever Ready (5/–)	25/–	18/–	35	30	24/6	—	6 2 5
Falk Stadelmann	27/–	17/6	10	6	17/6	—	6 17 2
Ferranti Pref.	25/6	22/–	7	7	22/–	—	6 7 3
G.E.C. :							
Pref.	31/9	26/3	6½	6½	27/6	—	4 14 6
Ord.	82/–	61/3	17½	20	75/–	—	5 4 4
Greenwood & Batley ...	27/6	22/6	7	15	22/6	—	13 6 8
Hall Telephone (10/–) ...	22/3	18/6	15	15	18/9	—	8 0 0
Henley's (5/–)	21/–	15/–	20	20	17/6	—	5 14 3
4½% Pref.	23/–	18/9	4½	4½	18/9	—	4 16 0
Hopkinsons	46/3	37/3	12½	15	37/6	—	8 0 0
India-Rubber Pref. ...	21/3	18/9	5½	5½	18/9	—	5 17 4
Intl. Combustion	120/–	97/–	32½	32½	5	—	6 10 0
J. Lucas	60/–	45/–	15	15	51/3	+2/3	5 17 0
Johnson & Phillips ...	41/3	32/–	12½	12½	40/–	—	6 5 0
Lancashire Dynamo ...	72/–	55/–	25	25	2½	—	10 0 0
Laurence Scott (5/–) ...	12/–	9/6	15	15	9/6	—	7 18 4
London Elec. Wire ...	31/6	28/6	12	7½	28/9	—	5 4 4
Mather & Platt	50/–	39/–	13½	13½	45/–	—	6 0 0
Metropolitan Elec. Cable Pf.	21/3	21/–	5½	5½	21/3	—	5 3 0
Murex	85/9	63/9	20	20	75/–	—	5 6 9
Pye Deferred (5/–) ...	13/9	7/6	25	25	7/6	—	16 13 4
Revo (10/–)	35/6	25/–	17½	17½	25/–	—	7 0 0
Reyrolle	61/–	52/6	12½	12½	53/9	—	4 13 0
Siemens Ord.	26/9	18/9	7½	7½	20/–	—	7 10 0
Strand Elec. (5/–) ...	5/6	2/0	10	4	2/–	−6d.	8 0 0
S. Smith (1/–)	9/–	6/–	37½	50	6/3	—	8 0 0
Switchgear & Cowans (5/–)	15/–	10/–	20	20	11/3	—	8 18 0
Telegraph Condenser (10/–)	7/6	5/–	5	—	7/6	—	—
Telegraph Construction ...	2½	32/6	10	10	32/6	—	6 3 1
Telephone Mfg. (5/–) ...	10/–	7/–	9	9	8/–	—	5 12 6
Tube Investments... ...	91/–	72/6	23¾	23¾	83/9	—	5 14 0
Vactric (5/–)	4/3	2/3	10	4	2/6	—	8 0 0
Vickers (10/–)	24/6	14/6	10	10	17/3	—	5 16 0
Ward & Goldstone (5/–) ...	22/6	19/6	20	20	19/9	—	5 1 3
Westinghouse Brake ...	54/9	36/–	17½	17½	2½	—	8 4 9
Walsall Conduits (4/–) ...	31/9	21/3	55	55	25/–	—	8 16 0
West, Allen (5/–)	7/6	5/9	7½	10	6/3	—	8 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Australia.—December 6th. Victoria Railway Commissioners. Two 1,500-kVA and one 750-kVA transformers. (T. 28222/39.)*

MELBOURNE.—State Electricity Commission of Victoria. The closing date for the receipt of tenders for the supply of two 12,000-kW water-driven turbo-generators (reference T. 25686/39)* has been postponed to January 3rd, 1940.

Belfast.—December 8th. Electricity Department. Fire extinguishing equipment, mercury arc rectifier equipment and other plant. (See this issue.)

Birmingham.—December 8th. Electric Supply Department. High - pressure steam pipework and associated valves and drain pipework for four new boilers and two new turbo-alternators at the Hams Hall "B" power station. (October 20th.)

Dundee.—Public Health Committee. November 27th. Battery electric lighting installation at Maryfield Hospital. Particulars from city quantity surveyor, 21, City Square. Tenders to town clerk.

Edinburgh.—December 4th. Commissioners of Northern Lighthouses. Renewal of the siren fog signal installations at Inchkeith and Corsewall lighthouses. Particulars from Mr. J. Oswald, engineer to the Board (£2 2s.). Tenders to J. Glencorse Wakelin, secretary, 84, George Street.

Eire.—December 11th. County Donegal Vocational Education Committee. Electric lighting and central heating installations at Stranorlar Technical School; C. V. McLaughlin, architect, Letterkenny.

New Zealand.—WELLINGTON.—December 5th. Public Works Department. Fifty 5-kVA transformers. (T. 27809/39.)*

February 13th. Three single-phase transformer units. (T. 28146/39.)* Two 2,250-kVA three-phase boosting transformers. (T. 28144/39.)*

February 20th. Seven single-phase transformer units. (T. 28148/39.)* Four single-phase transformer units. (T. 28147/39.)*

March 26th. Four single-phase transformer units. (T. 28143/39.)*

March 12th. 110-kV outdoor switchgear and steelwork. (T. 28145/39.)*

January 9th (Extended date). 50-kV outdoor switchgear for Hangatiki substation and 110-kV outdoor switchgear and steelwork for Ongarue sub-station. (T. 27495/39.)* Four 10,000-kVA transformer units. (T. 27496/39.)*

December 13th. Switchboard cable. (T. 28213/39.)*

January 16th. Two sets of 11,000-V metal-clad switchgear. (T. 28857/39.)*

February 13th. Remote control equipment. (T. 28791/39.)*

February 27th. 22,000-V switchgear. (T. 28858/39.)* 11,000-V switchgear. (T. 28789/39.)*

Northern Ireland. — MAGHERAFELT.—November 28th. Installation of electric light and power wiring and fittings. Technical School extension, for Regional E.C.; R. T. M'Guckin, architect, Garden Street, Magherafelt.

Northleach.—Electrically driven surface pumping plant for R.D.C.; John H. Haiste, engineer, Middleton Chambers, Lowgate, Hull (deposit £1 1s.).

Plymouth.—November 25th. Electricity Supply Department. Circulating water screen at the Prince Rock generating station. (November 10th.)

Siam.—BANGKOK.—December 15th. Department of Municipal and Public Works. House service watt-hour meters. (T. 28535/39.)*

South Africa.—CAPE TOWN.—January 15th. Electricity Department. Booster pumps, complete with driving motors, &c., and piping, two sets of motor starting and control gear, two 3,300-V iron-clad switchboards, two 380/220-V iron-clad distribution boards and one overhead travelling crane. (T. 27966/39.)*

PRETORIA.—Public Works Department. December 7th. Supply of two double-wound, three-phase, indoor, oil immersed transformers. (T. 28767/39.)*

JOHANNESBURG.—January 6th. Fire-fighting equipment. (T. 28771/39.)*

Wolverhampton.—November 28th. West Midlands Joint Electricity Authority. Two 2,000-kVA transformers. (November 3rd.)

December 18th. Coal storage plant for Ironbridge power station. (See this issue.)

Orders Placed

Barking.—Electricity Committee. Recommended. Renewal of contract for cables for twelve months.—Union Cable Co.

Colchester.—Town Council. Accepted. Electrical installation in the new police headquarters (£353).—Joslins, Ltd.

Essex. — County Council. Accepted. Electric lighting installation at agricultural institute at Writtle (£162).—Elnaugh & Son; special electrical fittings (£66).—Harcourts.

Glasgow.—Transport Committee. Accepted. Magnet coils.—E.M.B. Co., Ltd.

Shildon.—Durham County Education Committee. Accepted. Electrical installation at school (£454).—R. Robson.

London.—L.C.C. Education Committee. Accepted. Reconditioning electric lighting at Beaufort House School, Fulham (£966).—Jacob, White & Co. Installation of electric lighting at Broadwater school (Balham and Tooting) (£1,203).—Keeble, Ltd. Installation of electric lighting, Hay Currie school, Poplar (£869) and Kilmorie school (Lewisham) (£1,125).—Carr Bros. & Carr (Wandsworth).

Reconditioning electric lighting installation Oliver Goldsmith school, Camberwell (£1,097).—A. Hawkins & Sons. Installation of electric lighting, Plough Road school, Battersea (£800).—Johnson & Tanner. Reconditioning electric lighting installation, Princess May Road school, Stoke Newington (£881).—Commercial Light, Heat & Power Co.

Installation of electric lighting Sherbrooke Road school, Fulham (£888) and new school on the Whitefoot Lane site, Lewisham (£784).—Newman & Watson. Installation of electric lighting at Churchdown school, Lewisham (£897).—South Metropolitan Electric Light & Power Co.

Financial Section (*concluded from page 688*)

Bankruptcy Proceedings—contd.

suspended for six months until April 10th, 1940.

R. J. Horton, electrical engineer, 204, Coldharbour Lane, Brixton, London.—Last day for receiving proofs for dividend November 27th. Trustee, Mr. C. Latham, 185-188, High Holborn, London, W.C.1.

W. S. Scott (West End Radio), radio engineer, 452, West Road, Newcastle-on-Tyne.—Last day for receiving proofs for dividend November 30th. Trustee, Mr. P. J. McLellan, Gibb Chambers, Westgate Road, Newcastle-on-Tyne, Official Receiver.

W. G. Harden and **C. H. Chinery** (Harden & Chinery), electrical and mechanical engineers, 7, Barnsbury Street, Islington, London.—First and final dividend of 11d. in the £, payable at Carey Street, London, W.C.2.

Reports and Dividends

Crabtree Electrical Industries, Ltd., held its annual meeting on November 16th when Mr. H. F. McLoughlin (chairman), who presided, said that it was gratifying, in view of the successive international crises, that they were able to show trading results during the year under review comparable with those in the previous year. The large extension to the grey iron foundry was now well under way and, in addition, the inclusion of a non-ferrous section would prove of considerable utility in widening their range of manufacturing facilities.

During the past year, considering the restrictive measures in force, their export trade had shown satisfactory expansion, and this had been notably the case in connection with their automatic switches for the protective control of electric motors—the largest range of products designed and manufactured by the subsidiary company. In the home market, too, employment of this range of protective switchgear was being standardised by most of the leading firms in the engineering, chemical, woodworking and other industries, either as a component part of their products or for use in their manufacturing processes. The research and designs sections of their works continued to develop new products with the object of further expanding their activities. All manufacturing departments had continued to work at maximum capacity, and a larger volume of orders was in hand than ever before.

Electrical Switchgear and Associated Manufacturers, Ltd., reports an income for the year ended October 31st of £22,260 as compared with £32,062 for the preceding year, and a net profit of £14,213 (against £23,186). As we have already reported, the ordinary dividend for the year is 10 per cent. (against 16 per cent.), and £8,804 is carried forward (against £7,265 brought in).

The net profit to July 31st of Brookhirst Switchgear (the subsidiary company) was £19,191 as compared with £34,270 for 1937-38, and after providing £9,000 for tax, £12,285 for dividends, £1,000 for A.R.P., and £140 for the welfare fund, a balance of £45,887 is carried forward (against £40,122 brought in).

The report of the parent company states that the profit of the subsidiary company has not reached anticipations. There was a fall in value of turnover, which coincided with reduced selling prices brought about by a temporary increase in intensity of competitive conditions. Production was seriously affected by unsettled general conditions and rising costs were unable to be overtaken quickly enough by increases in selling prices. In comparison with the corresponding period of last year the total value of orders received during the current financial year show a substantial increase.

J. & F. Stone Lighting & Radio reports a trading profit of £102,252 for the year to June 30th, as compared with £83,571 for the preceding year, to which is added transfer fees, £87, making £102,339. From the profits £9,031 is allocated to amortisation of leases and depreciation of fixtures and £1,000 to board fees. Preference redemption receives £6,323 and preference dividends absorb £11,348. A sum of £55,000 has been set aside, bringing the total reserves against possible losses on subsidiary company under hire-purchase agreements to £85,718, irrespective of the subsidiary company's own reserves. Earnings on the ordinary shares were £80,960, equalling 20 per cent. net. The interim was 5 per cent. (unchanged), but no final dividend is proposed (against 5 per cent.), and the balance carried forward is £7,375 (against £7,737 brought in).

The Chloride Electrical Storage Co., Ltd., is again paying an interim dividend of 5 per cent.

Franco Signs, Ltd., has declared an interim dividend of 1 per cent. (against 4 per cent.).

Sydney S. Bird & Sons have announced a final dividend of 7½ per cent. (against 12½ per cent.), making 12½ per cent. for the year to September 30th (against 17½ per cent. for 1937-38).

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick (NORTHUMBERLAND).—A.R.P. shelters at Alnwick and Morpeth (£11,000); R. & G. Brown, Ltd., contractors, Albert Street, Amble, Northumberland.

Ashington (NORTHUMBERLAND). — A.R.P. shelters at Ashington and Newbiggin; W. M. Wilson, Ltd., contractors, Cambois, Blyth, Northumberland.

Barking.—Extensions to factory; Cape Asbestos Co., Hart Lane.

Factory extension, River Road; Holmes Marine Life Protection Association, Ltd.

Bedlington (NORTHUMBERLAND). — A.R.P. shelters; J. W. Urpeth, contractor, Front Street, Bedlington.

Berwick-on-Tweed. — A.R.P. shelters; J. H. Pierce, contractor, Berwick.

Billingham-on-Tees. — Additions to Billingham Social Club; F. W. Turnbull, architect, White House, Carlton, Stockton.

Bingley.—Factory; G. Greenwood & Son, Manywells.

Birmingham.—Extensions to works; J. H. Yeomans & Sons, Evesham Road, Astwood Bank.

Factory for Marshall & Son, Pope Street; Dallas & Lloyd, architects, 45, Newhall Street.

Extensions to works, for Birmetals, Ltd., Quinton; J. Bowen & Sons, contractors, Balsall Heath.

Blackburn.—Factory at Great Harwood, for Oxo, Ltd., The Green Park, Aston Clinton, Aylesbury, Bucks.

Blackpool.—Extensions to factory, for Cheswick and Wright, Ltd., Preston New Road, Marton; Skerfoot & Son, contractors, 62, Bryan Road.

Bolton.—Extensions to works, for Bolton Gate Co., Tipping Street; R. Watson & Sons, contractors, High Street.

Bournemouth.—Health centres, East Howe and Stuart Road; borough surveyor.

Bradford-on-Avon.—Sawmills at Elms Cross, for Holbrow Bros., Ltd.

Chailey.—Extensions to Isolation Hospital, for R.D.C.; R. P. Theale, architect, Council Offices, 31, High Street, Lewes.

Crayford. — Cleansing stations and stores at Crayford and Barnehurst, for U.D.C.; F. A. Turner, architect, Municipal Buildings.

Cumberland.—Decontamination centre and boiler house, rear of West Cumberland Steam Laundry, Workington, for C.C.; county architect, Alfred Street North, Carlisle.

Darlington.—Additions to offices, Allan Street, for J. Shewell and Co.; W. Sanders Hutton, Ltd., builders, Post House Wynd, Darlington.

New premises for F. W. Woolworth, Ltd.; plans by company's staff at headquarters, Liverpool.

A.R.P. training centre and store, Cleveland Street; R. Blackett and Son, builders, Bondgate, Darlington.

Dawlish.—New hospital, Burlesdon House, for local Hospital Committee; secretary.

Dudley.—Extensions to works; Walker Bros., Cradley Road, Netherton.

Durham City.—Chapel (£6,000); D. Glen, contractor, Back Queen's Road, Jarrow.

Felling-on-Tyne. — Rebuilding offices, works and warehouse; Patterson's Lamps, Ltd., Sunderland Road.

Glasgow.—Additions to premises at Lochburn, Maryhill, for Cooper McDougall & Robertson, Ltd., chemical manufacturers; Wm. Bailie & Son, architects, 2, West Regent Street.

Extensions to constructional shop at 92-142, Rigby Street, for Sir William Arrol & Co., Ltd., 85, Dunn Street; the manager.

Houses (76), Pollok estate; housing director.

Extensions to Camphill police barracks (£5,552); A. M. MacDoughall & Co., Ltd.

Four temporary churches at housing estates (£1,000 each) for Church of Scotland Extension Committee; Rev. W. H. Harrowes.

Gosforth (NEWCASTLE).—Air-raid shelters; J. W. Dorin & Sons, contractors, Queen's Road, Monkseaton, Whitley Bay.

Haltwhistle. — Factory for Viscose Development Co., Ltd., Bromley, Kent.

Hart (Co. DURHAM).—Police station and court; Bell & Ridley, contractors, Sherburn Road, Durham City.

Haslemere.—Civic centre, Weysprings, for U.D.C.; C. A. Best, architect, Museum Hill.

Haverfordwest.—Factory on 20-acre site, for Cow and Gate, Ltd., Guildford.

Hebburn-on-Tyne.—Conversion of old reservoir, Hill Lane, into air-raid shelter; S. and H. Oake, builders, Charles Street.

First aid station at infants' school and nine air-raid shelters, for the U.D.C.; surveyor.

Air-raid shelter; S. & H. Oake, contractors, Victoria Road.

Auxiliary fire station, first aid post, decontamination centre; E. G. Lediard, surveyor, Council Offices.

Hexham.—A.R.P. shelters at Hexham and Prudhoe; R. C. Williamson, contractors, Strathmore Road, Rowlands Gill, Co. Durham.

Hull.—Hall and offices, George Street, Wincolmlee; Transport and General Workers' Union, Transport House, Smith Square, S.W.1.

Jarrow-on-Tyne. — Rebuilding, British Legion Club, Ormonde Street; secretary.

Kielder (NORTHUMBERLAND).—School; W. W. Tasker, architect, Council Offices, Mitford Road, Morpeth.

Lanarkshire. — Twelve cleansing stations, for C.C.; J. Stewart, county architect, 191, Ingram Street, Glasgow.

Leicester.—Casualty and X-ray departments at the Leicester Royal Infirmary for the Board of Management; Pick, Everard, Keay & Gimson, architects, 6, Millstone Lane, Leicester.

Lindsey.—Extensions, Alford Council School, for C.C.; county architect, County Offices, Newland, Lincoln.

Liverpool.—Extensions to St. Oswald's Church, Old Swan, Liverpool (£15,000); Sir Giles G. Scott, 3, Field Court, Grays Inn Square, London, W.C.1.

London.—(CATFORD).—Flats, Burnt Ash Hill; J. C. Anderson, architect, 81, High Street, S.E.13.

(ELTHAM).—Extensions to factory, G. Whitehead & Co., Hainault Street; Campbell & McGill, contractors, High Street, Chislehurst.

(DEPTFORD).—Departmental store, 110, Deptford High Street, for F. W. Woolworth & Co., Ltd.

(LEWISHAM).—Factory, Ashgrove Road; T. H. Sawyer & Son, Ltd.

(NORBURY).—Extensions to factory; S. M. Stuart Turner & Co., London Road, London, S.W.16.

(ST. MARYLEBONE).—Block of offices, Marylebone Road; Culpin & Son, architects, 21, Ebury Street, S.W.1.

(STEPNEY).—Tenements, Wapping estate (£16,261); R. J. Rowley, Ltd., builders, Belmont Works, Belmont Avenue, N.17. Tenements, Phœbe Street area; W. J. Simms, Sons & Cooke, Ltd., builders, 1, John Street, W.C.1.

Manchester. — Extensions to works, Sunny Brow Road, Gorton; W. Thorpe & Sons, contractors, Chester Road, Cornbrook.

Morecambe.—Extensions to transport depôt; R. Rose, town clerk, Town Hall.

Murton (Co. DURHAM).—Air-raid shelters for the C.C.; county architect, 34, Old Elvet, Durham.

Branch premises for the Murton Co-op. Society; C.W.S. Architects' Department, 90, Westmorland Road, Newcastle-on-Tyne.

Newcastle-on-Tyne. — Twelve houses, Broadwood Road; E. Jeffcock, Walbottle Road, Newburn.

Air-raid shelters for E. and J. Richardson, Elswick; L.N.E.R., Forth Banks; Scotia Wool Co., New Bridge Street; Martins Bank, Ltd., Gallowgate; Pumphrey and Carrick, Cloth Market and Blackett Street; Education Offices, Northumberland Road; Cussins, Ltd., Granville Court; R. Charlton, Ltd., Waterloo Street; and the Union Cold Storage Co., Ltd., Churchill Street.

Additions to premises in Bath Lane for John Sinclair, Ltd.; John Jackson and Sons, builders, Corporation Street.

Newport (MONMOUTHSHIRE).—Factory, Countyballs Works; C. Howard Crane, architect, Romney House, Marsham Street, S.W.1.

Factory buildings; Meik and Halcrow, engineers, 16, Victoria Street, Westminster, S.W.1.

North Riding.—Shelters at Eston, Redcar and Thornaby School, for the C.C.; county architect, County Hall, Northallerton.

Proposed new school at Ormesby (£13,000); county architect.

Northumberland. — Food centres at Wallsend and twelve other places; A. Cheyne, county engineer, Council Offices, Mitford Road, Morpeth.

Shelters at Whitley Bay, Gosforth, Longbenton and Blyth (£27,000); Gibson Bros., contractors, Hill Heads, Whitley Bay.

Nottingham.—Church in Foster Avenue; R. Harley Smith, architect, Gordon House, Carrington Street, Nottingham.

Paignton.—Hotel, Foxhole Lane, for Mid-Devon Estates, Ltd.; Powell and Powell, architects, 3, Lower Terrace, Torquay.

Poynton.—Estate development, South Drive and Black Road; Charmond Construction Co., Ltd.

Rotherham.—Reconstruction of the Crown Hotel, Moorgate Street; D. B. Jenkinson, architect, Imperial Buildings, High Street.

New offices; Abbot Bros. and Leigh, Ickles Forge.

Rushden. — Premises, High Street South, for A. Abbott & Sons.

Sheffield.—Workshop, office and store, White Croft and Hollis Croft, for T. R. Ellin (Footprint Works), Ltd., 31, Hollis Croft, Sheffield, 1.

Warehouse and offices, Rockingham Street and Wellington Street; Peacock and Bewlay, architects, 83, Colmore Road, Birmingham.

Offices and canteens, Saville Street, Sutherland Street, Harleston Street, and workshops, Carlisle Street East and Forncett Street; A. Bradbury & Son, contractors, 334, Cemetery Road, Sheffield.

Workshops, Corby Street, for Spear and Johnson, Ltd.

Workshops and air-raid shelter, Trafalgar Street; Frank Robson, Ltd., contractors, 120, Harcourt Road, Broomhill, Sheffield, 10.

Tailoring workroom and furniture store, Cemetery Road, for Sheffield and Ecclesall Co-operative Society, Ltd., Ecclesall Road.

Workshops and air-raid shelters, Wellington Street, for Jepson & Co., Ltd., 20, Wellington Street.

Houses (20), Lathkill Road, for Moorhouse and Brind, Masefield Road.

Warehouses offices garage and store Copper Street and Cupola for Mannings & Co.

Houses and garages Hemper Lane and Westwick Road, for R. Jones, builder, Greenfield Road, Woodseats, Sheffield, 8.

Southport.—Extensions to works at Churchtown, Southport; Clough & Gaskell, Ltd., contractors, Billinge Road Saw Mills, Pemberton, Wigan.

South Shields.—A.R.P. offices; D. Glen, contractor, Back Queen's Road, Jarrow, Co. Durham.

Stokesley.—Fire station; R.D.C. surveyor.

Stroud.—Fire station, Spring Hill, Nailsworth; R.D.C. surveyor.

Sunderland.—Rebuilding Board Inn, Middle Herrington, for the Tadcaster Tower Brewery Co., Ltd.; J. G. Poulson, architect, 25, Ropergate, Pontefract.

Valley. — Extensions, Waterworks pumping station, Rhosneigr, Anglesey, for R.D.C.; H. Adams & Son, engineers, Fron Heulog, Bangor, North Wales.

Walsall.—Shelters (£11,000); borough surveyor.

Warmley.—Fire station, opposite Council Offices; R.D.C. surveyor.

Wolverhampton.—Control station, first aid post, store and offices, Park Lane, for Henry Meadows, Ltd., Park Lane, Fallings Park; McKeand Smith & Co., Ltd., contractors, Showell Road, Bushbury, Wolverhampton.

Workington.—Bottling store, for Workington Brewery Co., Ltd.